California Regional Water Quality Control Board
Santa Ana Region

February 3, 2005

ITEM: 18

SUBJECT: **Public Workshop: Proposed Basin Plan Amendment – Incorporation of Total Maximum Daily Loads (TMDLs) for Bacterial Indicators for the Middle Santa Ana River Watershed**

California Regional Water Quality Control Board
Santa Ana Region

Staff Report on Bacterial Indicator Total Maximum Daily Loads in the Middle Santa Ana River Watershed

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February 3, 2005

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TOTAL MAXIMUM DAILY LOADS FOR BACTERIAL INDICATORS IN THE MIDDLE SANTA ANA RIVER WATERSHED

SECTION 1 – INTRODUCTION

Under Section 303(d) of the Clean Water Act, the Regional Water Quality Control Board (Regional Board) is required to identify surface waters that do not or are not expected to meet water quality standards (beneficial uses, water quality objectives) with the implementation of technology–based controls. Once a waterbody has been added to the 303(d) list of impaired waterbodies, a Total Maximum Daily Load (TMDL) must be developed for that waterbody and the pollutant causing impairment. A TMDL is established to address the pollutant causing impairment and thereby ensure that a waterbody will attain and maintain water quality standards, taking the existing pollutant loads and reasonably foreseeable increases in pollutant loads into consideration. TMDLs must include the following elements:

1. Identification of the extent of the impairment problem (Problem Statement).
   - A. Identification of the impaired waterbody and tributary waterbodies.
   - B. Identification of the pollutant impairing the subject waterbody(ies).
   - C. Identification of the degree of impairment.
   - D. Identification of the sources of the impairing pollutant and the relative magnitude of the pollutant loading from identified sources.
2. Wasteload allocations for point sources discharging to the subject waterbody(ies).
3. Load allocations for nonpoint sources discharging to the subject waterbody(ies).
4. An implicit or explicit margin of safety
5. Consideration of seasonal variations and critical conditions for the allocated pollutant.
6. An allowance for future growth, which accounts for reasonably foreseeable increases in pollutant loads.
7. An implementation plan for achieving the identified TMDL and allocations.
8. A monitoring program to measure the success of implemented measures for achieving the TMDL; and
9. Public participation.

Several waterbodies in the Middle Santa Ana River Watershed were added to the 303(d) list due to high densities of bacterial indicators. These waterbodies are: the Santa Ana River, Reach 3; Chino Creek, Reaches 1 and 2; Cucamonga Creek, Reach1, Mill Creek (Prado Area); and, Prado Park Lake. These waterbodies are shown in Figure 2. Board staff initiated development of these TMDLs in 2001; the TMDLs must be submitted to the United States Environmental Protection Agency by June 2005.

Note: SB county line denotes R8 boundary. A portion of the MSAR watershed is outside of Region 8's boundary.

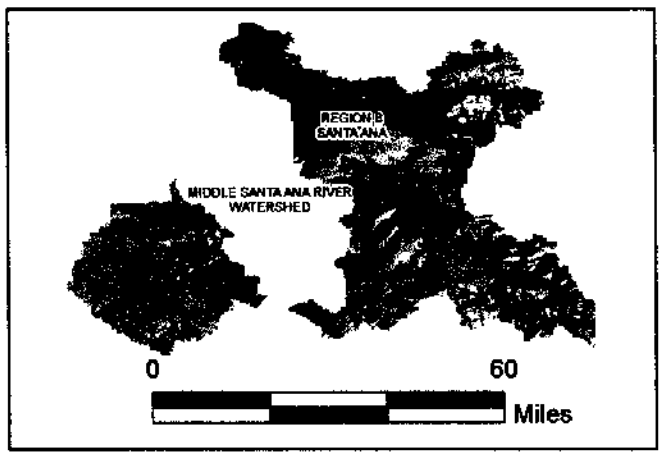
N

0 9 Miles

16th
Claremont
Upland
Rancho Cucamonga
Fontana
Montclair
Ontario
Pomona
Diamond Bar
Chino
Chino Hills
Norco
Riverside
Moreno Valley
Corona
Cajalco
Lake Elsinore

Middle Santa Ana River Watershed
County boundary
USFS area
Cities
Unincorporated County areas

FIGURE 1: MIDDLE SANTA ANA RIVER WATERSHED



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REGIONAL WATER QUALITY CONTROL BOARDS

Map created November 2004
Map created by: HB

Data Sources:
Cities and Unincorporated areas:
CA Spatial Information Library
Census 2000 Place Names (2003) (modified by RWQCB)
Middle Santa Ana River Watershed:
based on Calwater v. 2.2.1 boundaries (CA Spatial Information Library (2004),
Santa Ana River reach designations,
and GDT streets (2002-SWRCB)
County: CA Spatial Information Library (2004)
USFS boundary: USDA Forest Service
Geospatial Service and Technology Center (2000)

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SECTION 2 – ENVIRONMENTAL SETTING

2.1 Middle Santa Ana River Watershed

The Santa Ana River and its tributaries, which drain the southern portions of the San Gabriel Mountains and the San Bernardino Mountains, convey the largest volume of water among all rivers in southern California. As shown in Figure 1, the Middle Santa Ana River Watershed covers approximately 488 square miles and lies largely in the southwestern corner of San Bernardino County and the northwestern corner of Riverside County. A small part of Los Angeles County (Pomona/Claremont area) is also included. This watershed is comprised of three sub–watersheds. The first sub–watershed is the Chino Basin Watershed, which includes portions of San Bernardino County, Los Angeles County, and Riverside County. Surface drainage in this area is directed to Chino Creek and Cucamonga/Mill Creek in a generally southward direction, from the San Gabriel Mountains toward the Santa Ana River and the Prado Flood Control Basin. Prado Park Lake is located in the Prado Basin. The second sub–watershed is the Riverside Watershed, which is located in Riverside County. Surface drainage in this area is generally westward from the City of Riverside to the Santa Ana River, Reach 3. The third sub–watershed is the Temescal Canyon Watershed, which is also located in Riverside County. Surface drainage in this area is generally northward to Temescal Creek and then to the Santa Ana River just upstream of Prado Dam.

2.2 Middle Santa Ana River Watershed Waterbodies on the 303(d) List of Impaired Waters for bacterial indicators

The following is a description of the waterbodies included on the 303(d) list for bacterial indicators that are addressed by the proposed TMDL. These waterbodies are shown on Figure 2 and in photos throughout this section.

A. **Santa Ana River, Reach 3** – Reach 3 is that portion of the river that extends upstream from Prado Dam to the Mission Boulevard bridge in Riverside. Reach 3 was placed on the 303(d) list in 1988, however, only the lower segment of Reach 3 (behind Prado Dam) was designated as impaired. After TMDL development activities commenced and monitoring results were generated, the TMDL effort was expanded to include all of Reach 3 because monitoring results indicated that other areas of Reach 3 experienced elevated bacteria levels as well. Reach 3 generally flows from east to west and has a natural, unlined bottom, throughout most of its length; there is an approximately 3.5 mile stretch of the upper segment that has been straightened and has rip–rapped banks.

   Baseflow in the Santa Ana River, Reach 3 consists of nuisance runoff, rising groundwater, (see below) and discharges from several Publicly Owned Treatment Works (POTWs) that occur in Reach 3 or upstream Reaches. These POTW discharges include those from the City of Colton, the City of San Bernardino Rapid Infiltration and Extraction Facility (RIX), City of Riverside Water Quality Control Plant, Western Riverside Regional Wastewater Treatment Plant and the City of Corona Municipal Wastewater Treatment Plant (see Table 2)

Photo 1: Santa Ana River – Reach 3 at Mission Boulevard overpass, looking south downstream.

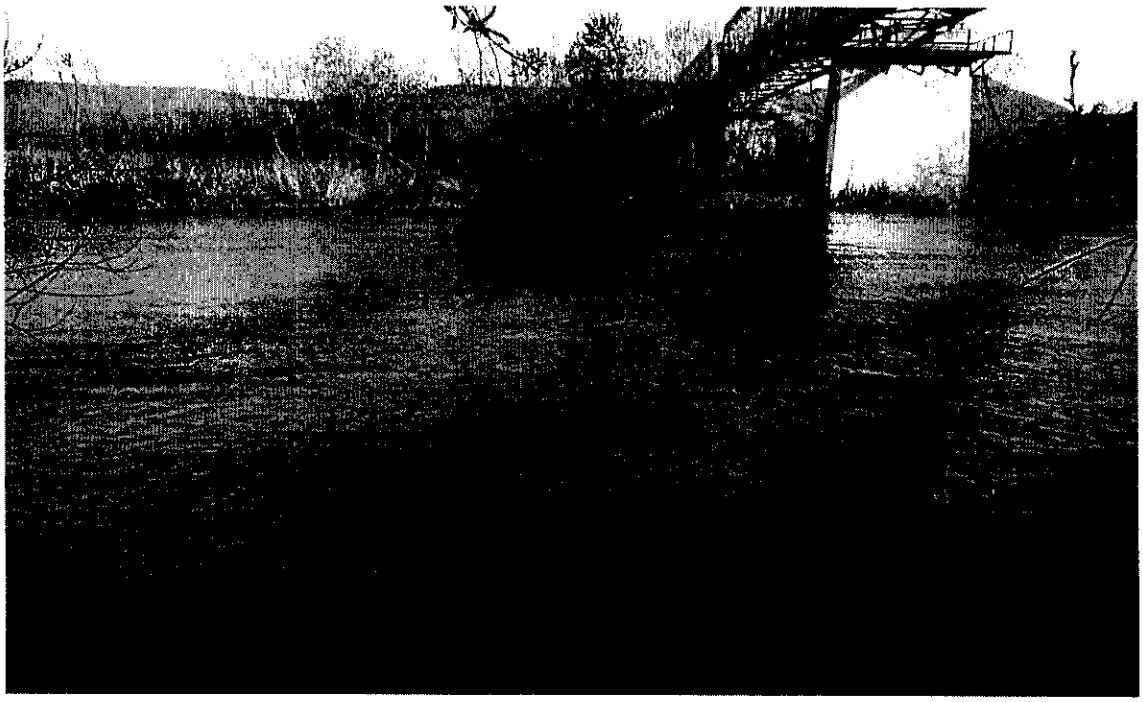


Photo 2: Santa Ana River – Reach 3, MWD Crossing (TMDL sampling location S1), looking north.

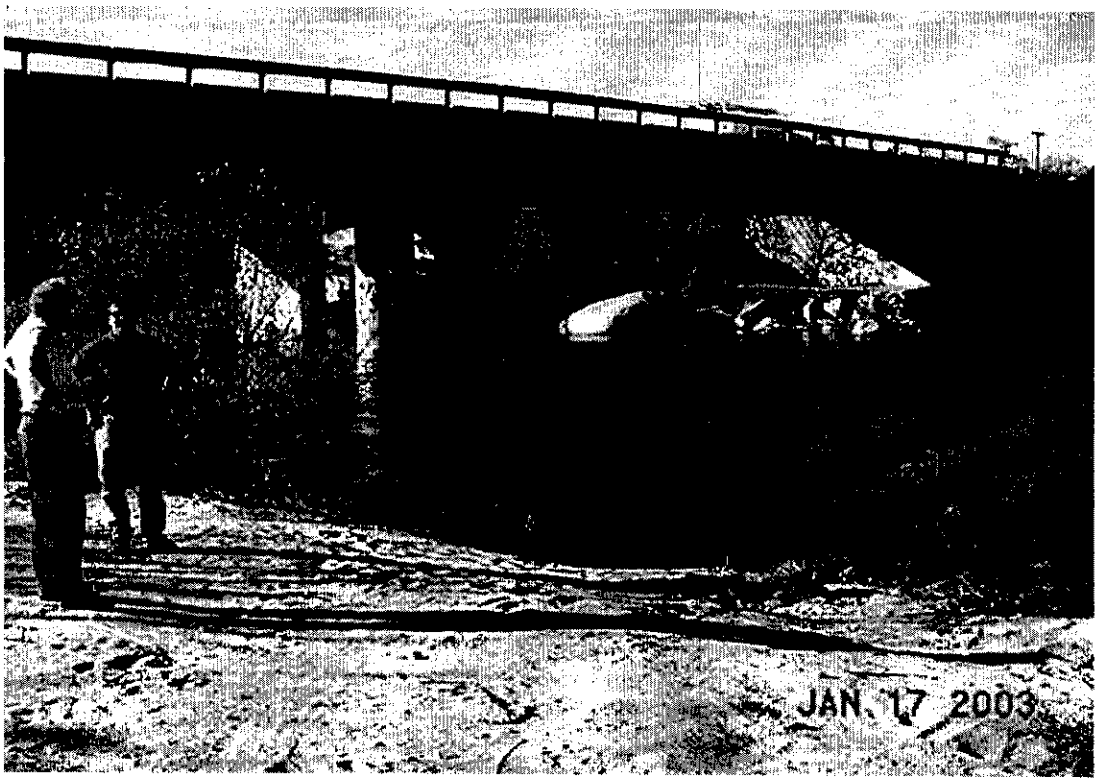


Photo 3: Santa Ana River – Reach 3 at Van Buren Avenue overpass, looking northwest.

Photo 4: Santa Ana River – Reach 3 at Prado Basin Park near River Road crossing, looking upstream (east).

B. Chino Creek, Reaches 1 and 2 – Chino Creek is a tributary of the Santa Ana River, Reach 3. It extends from its confluence with the Santa Ana River (directly behind Prado Dam) along the eastern base of the Chino Hills and into southern Pomona.

Chino Creek is divided into two reaches. As shown in Figure 2, **Reach 1**[1] is that portion of the creek that extends from the confluence with the Santa Ana River upstream to the beginning of the concrete-lined channel south of Los Serranos Rd. Reach 1 flows from north to south, and except for a short segment in the upper portion of the reach, has natural unlined bottom and banks. While this short upper segment is not concrete-lined, it is not in a natural state. The channel in this portion of the creek has been engineered into a straightened configuration, and rip–rap materials and boulders have been placed along the banks in places (See Photo 6). Chino Creek, Reach 1 was added to the 303(d) list in 1994.

Chino Creek, **Reach 2** – Chino Creek, Reach 2 extends from Los Serranos Rd. to the boundary of Region 8 with that of the Los Angeles Regional Water Quality Control Board (Region 4) at the Los Angeles/San Bernardino County line. This Reach of Chino Creek flows in a northwest to southeast orientation, and, as shown in Photo 5, is concrete-lined along the bottom and banks throughout its length. San Antonio Creek, an important drainage feature in western Chino Basin, is tributary to Chino Creek, Reach 2 at a location just north of Chino Avenue. Chino Creek, Reach 2 was added to the 303(d) list in 1998.

Baseflow in Chino Creek consists primarily of wastewater effluent discharges from IEUA's Carbon Canyon POTW and RP-5, and nuisance runoff.

[1] A Basin Plan amendment adopted by the Regional Board on January 24, 2004, and awaiting approval by the U.S. Environmental Protection Agency includes the subdivision of Reach 1 of Chino Creek into two reaches, 1A and 1B. Reach 1A extends from the Santa Ana River confluence to downstream of the confluence with Mill Creek. Reach 1B extends from the confluence of Mill Creek to the beginning of the concrete-lined channel south of Los Serranos Road. The confluence of Mill Creek is in Chino Creek, Reach 1B. Approval of this amendment will not result in a material difference in the proposed TMDL.

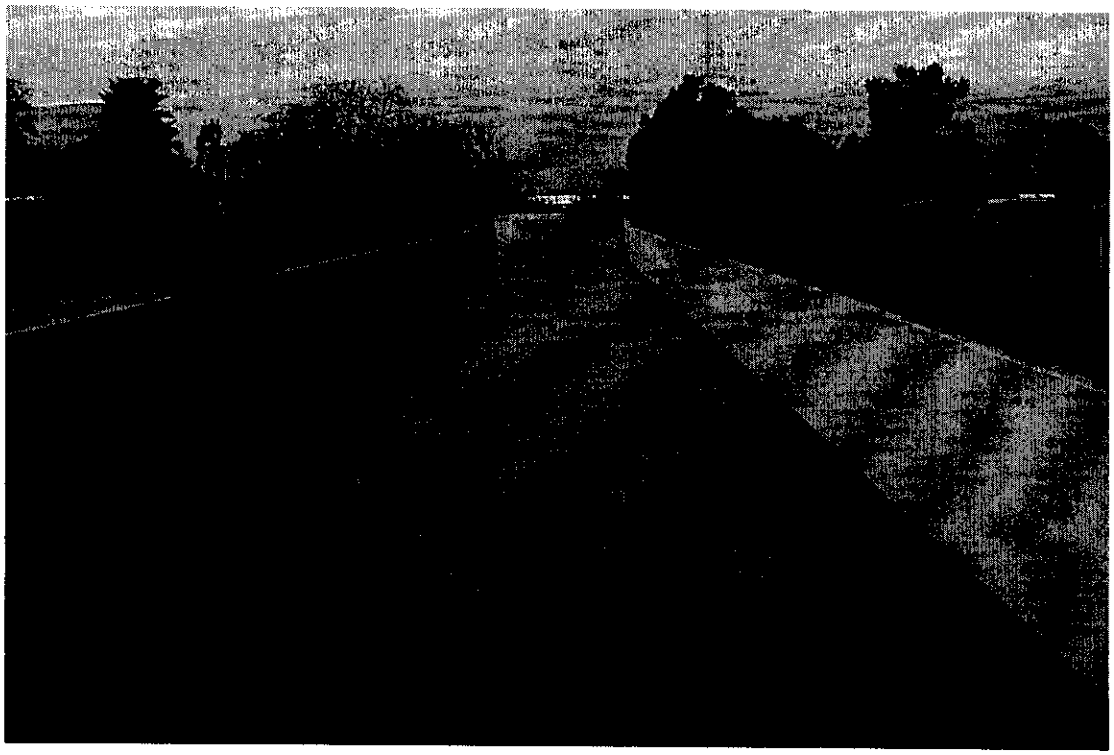


Photo 5: Chino Creek – Reach 2 (confluence of Chino Creek (on left and foreground) with San Antonio Channel (on back right)) at Chino Avenue, looking north.

Photo 6: Chino Creek transition of Reach 2 to Reach 1B, at Central Avenue overpass, looking northwest.

Photo 7: Chino Creek – Reach 1, at Central Avenue (TMDL sampling location C7), looking downstream (south).

Photo 8: Chino Creek – Reach 1, in Prado Basin near Prado Wetlands (TMDL sampling location C6), looking upstream (north).

C. **Mill Creek, Prado Area** – As shown in Figure 2, Mill Creek is tributary to Chino Creek, Reach 1 in the lower part of Prado Basin. Mill Creek extends from its confluence with Chino Creek to a location just upstream of Chino–Corona Road near the San Bernardino/Riverside County border. Upstream of this location, the creek is concrete–lined and is designated as Cucamonga Creek. Mill Creek generally flows in a northeast to southwest direction, and has a natural unlined bottom and banks (see Photos 9 and 10). Baseflow in Mill Creek consists primarily of wastewater effluent from IEUA's RP-1, and nuisance runoff. Mill Creek, Prado Area was added to the 303(d) list in 1994.

Photo 9: Mill Creek, Prado Area at Chino–Corona Rd overpass (TMDL sampling location M5), looking downstream (southwest).

Photo 10: Mill Creek, Prado Area at Chino–Corona Rd overpass (TMDL sampling location M5), looking downstream (south).

D. Cucamonga Creek, Reach 1 – As indicated above, Mill Creek is designated as Cucamonga Creek just upstream of Chino–Corona Road. Cucamonga Creek, Reach 1 extends from this "confluence" to the point where 23rd Street crosses the channel in the city of Upland. The segment of Cucamonga Creek upstream of this location is designated as Reach 2. Cucamonga Creek, Reach 1 flows from north to south, across the central part of the Chino Basin area, and, as shown in Photos 11 and 12, is concrete–lined along the bottom and banks throughout its length. As with Mill Creek, Prado Area, baseflow in Cucamonga Creek consists primarily of effluent from IEUA RP-1, and nuisance runoff. Cucamonga Creek, Reach 1 was added to the 303(d) list in 1998.

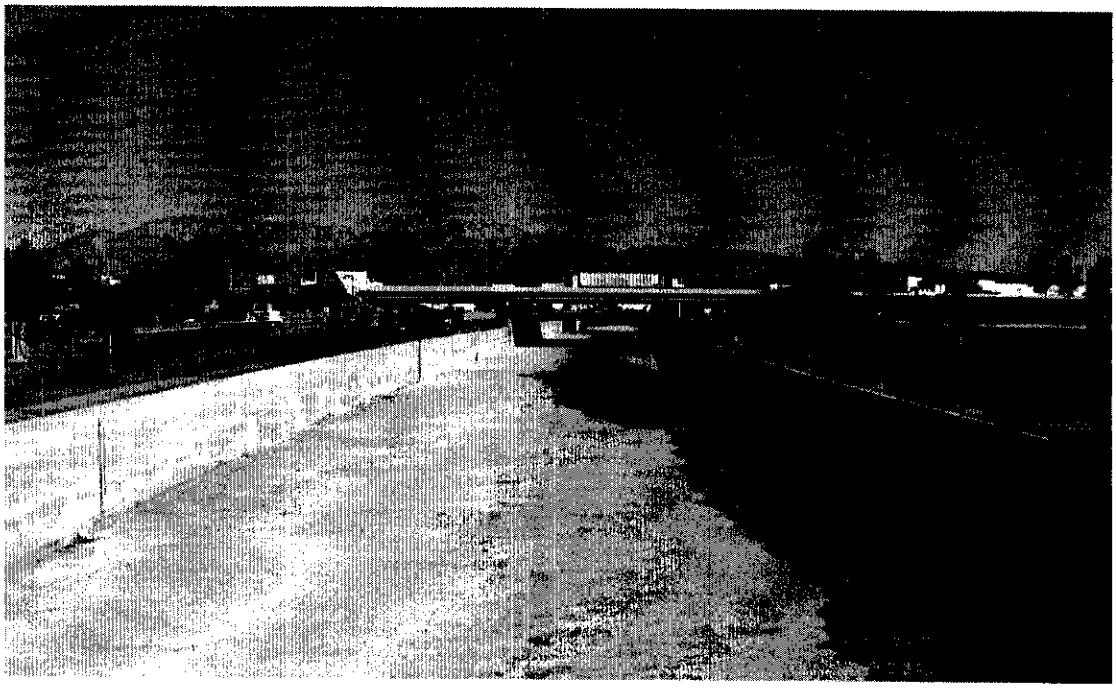


Photo 11: Cucamonga Creek – Valley Reach at IEUA's RP–1 (TMDL sampling location M2), looking upstream (north).

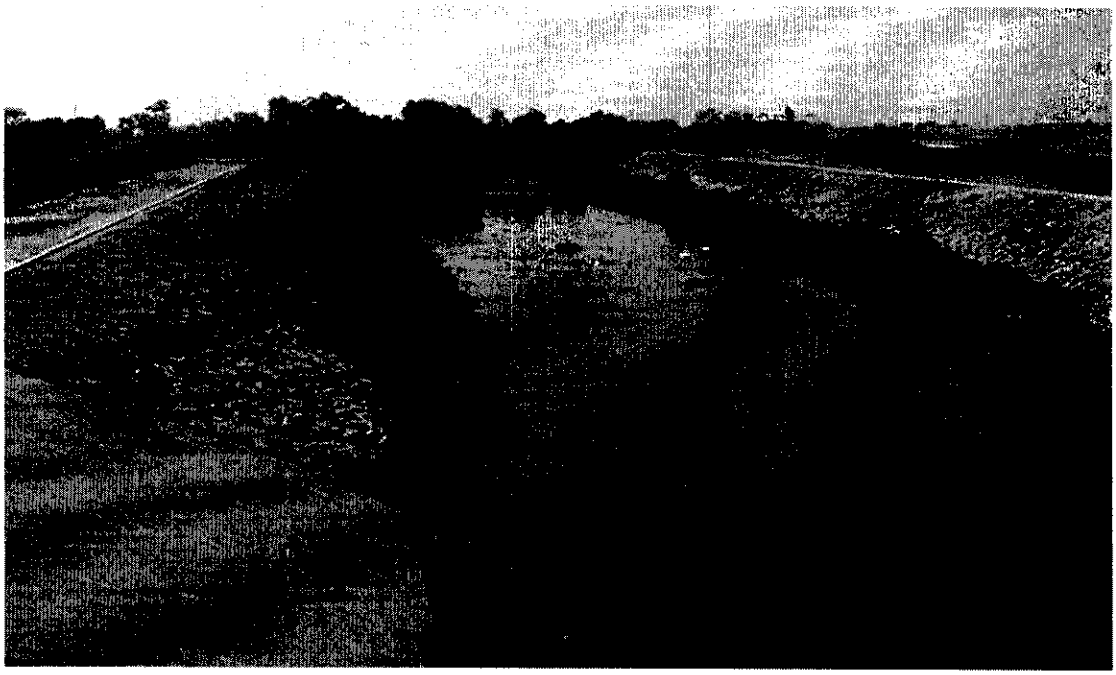


Photo 12: Cucamonga Creek, Valley Reach (transition to Mill Creek) at Hellman Avenue, looking downstream (southwest).

E. Prado Park Lake – Prado Park Lake is a 60–acre, man–made lake located within the 2000–acre Prado Park, in the southern part of Chino Basin near the junction of Highway 83 (Euclid Avenue) and State Highway 71 (see Figure 2). Water levels in Prado Park Lake are maintained through discharges of recycled water from Inland Empire Utilities Agency's (IEUA) Regional Plant No. 1. Approximately 8 million gallons per day (MGD) of recycled water are discharged to the lake by IEUA. This recycled water flows out of the lake through its outlet structure (see Photo 14), and, after a short distance, flows into Chino Creek, Reach 1. The lake supports fishing activities, human–powered boating, and wildlife (see Photo 13).

Prado Park Lake is actually situated at the confluence of two drainage channels – the Euclid Avenue storm channel and the Grove Avenue storm channel. During low–flow conditions, urban runoff from these two channels flows under the lake through pipes and discharges into the lake's outlet structure (see Photo 14). However, these pipes are undersized and, during large storm events, they cannot handle the storm flows. Consequently, storm water is discharged directly into the lake. In 1991 and in 1998, nutrient rich storm water entered the lake, which resulted in suppressed dissolved oxygen levels and fish kills. In such situations, the lake has to be completely drained, and the fish and residual contaminant materials removed. Prado Park Lake was placed on the 303(d) list in 1994 due to elevated nutrient levels as a result of the 1991 fish kill incident; elevated bacteria levels were also identified as a source of impairment based on best professional judgment. Follow–up sampling in 1998 confirmed high bacterial indicator levels.

Photo 13: Prado Park Lake, looking south.

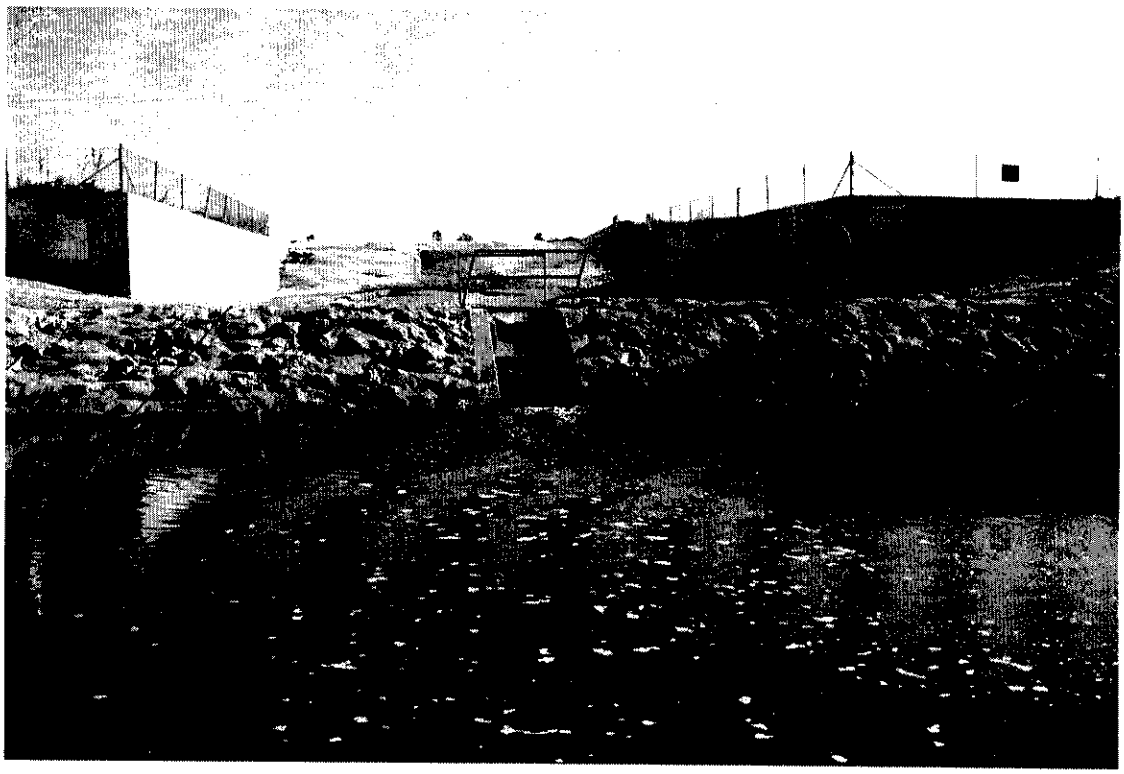


Photo 14: Prado Park Lake outlet structure (TMDL sampling location C3), looking east.

Note: SB county line denotes R6 boundary. A portion of the MSAR watershed is outside of Region 8's boundary.

N

0 6 Miles

San Antonin Dam

Prado Park Lake

Prado Dam

Prado Basin

Lake Matthews

Tequesquite Arroyo

Riverside Canal

Gage Canal

Temescal Wash

Arlington Drain

Santa Ana River, Reach 3

Chino Creek, Reach 1

RIVERSIDE

MISSION

VAN BUREN

BON VIEW

SCHAEFER

MERRILL

CLOVERDALE

HAMNER

PINE

CHINO CORONA

P1 P2 P3 P4 P5 P6 P7 P8 P9,10 P11 P12 P13 P14

2002 Region 8 303(d) listed lakes for bacterial indicators

P1: indicates location of photo discussed in text

Rivers/Creeks

2002 Region 8 303(d) listed rivers/creeks for bacterial indicators

Lakes

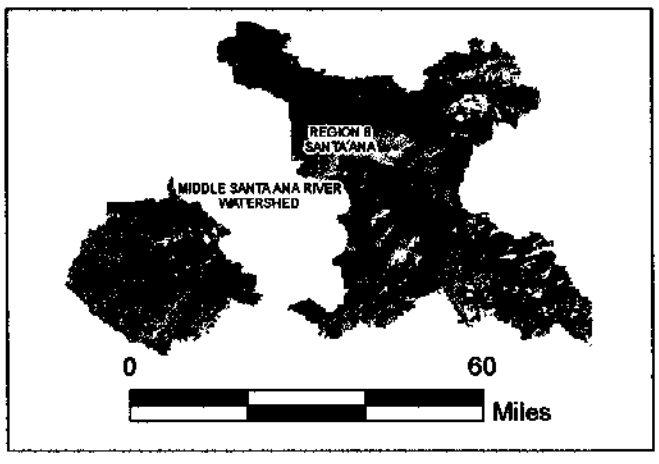
Middle Santa Ana River Watershed

County boundary

Freeways/highways

Major streets

FIGURE 2: MIDDLE SANTA ANA RIVER WATERSHED 303(d)-LISTED WATERBODIES



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REGIONAL WATER QUALITY CONTROL BOARDS

Map created January 2005
Map created by: HB

Data Sources:
Middle Santa Ana River Watershed:
based on Calwater v. 2.2.1 boundaries -
CA Spatial Information Library (2004),
Santa Ana River reach designations,
and GDT streets (SWRCB, 2002)
County: CA Spatial Information Library (2004)
Rivers/creeks, and lakes:
CA Spatial Information Library (1998)
2002 303(d) listed water bodies:
SWRCB (2003)

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2.3 Land Uses

Land uses in the Middle Santa Ana River watershed include urban, agriculture, and open space (Table 1). Although originally developed as an agricultural area, the watershed is being steadily and rapidly urbanized. Incorporated cities in the Middle Santa Ana River watershed include Pomona, Chino Hills, Upland, Montclair, Claremont, Ontario, Rancho Cucamonga, Rialto, Chino, Fontana, Norco, Corona, and Riverside. In addition, there are several pockets of urbanized unincorporated areas. The current population of the watershed, based upon 2000 census data, is approximately 1.4 million people. The principal remaining agricultural area in the watershed is the area formerly known as the Chino Dairy Preserve. This area is located in the south–central part of the Chino Basin watershed and contains approximately 300,000 cows, which generate the waste equivalent of more than two million people. Recently, the cities of Ontario and Chino annexed the San Bernardino County portions of this area. The remaining portion of the former preserve, which is in Riverside County, has not been incorporated. Since this dairy area is unsewered, dairy operations have significantly affected the quality of the water resources in the area. Irrigated agriculture and dry land agriculture land uses in the watershed principally produce crops grown to support the dairy operations. Open space areas in the watershed include National Forest lands and State Parks lands.

Table 1 – Land Use in the Middle Santa Ana River Watershed (approximate acreage)

County	Urban[1]	Agriculture [2,3]	Open Space[4]	Total
San Bernardino	135,400	15,800	26,800	**178,000**
Riverside	43,100	21,200	40,300	**104,600**
Los Angeles	22,900	0	6,700	**29,600**
Totals	**201,400**	**37,000**	**73,800**	**312,200**

[1] Various sources including city and agency engineering, public works, and other departments.

[2] Agriculture land use includes both irrigated agriculture, dry land agriculture and confined animal feeding operations (CAFOs)

[3] 1990 data from Chino Basin Water Resources Management Study, Chino Basin Water Resources Management Task Force, 1995.

[4] Estimated based upon United States Geological Survey 7.5 Minute Topographic Maps.

Note: SB county line denotes R8 boundary. A portion of the MSAR watershed is outside of Region 8's boundary.

N

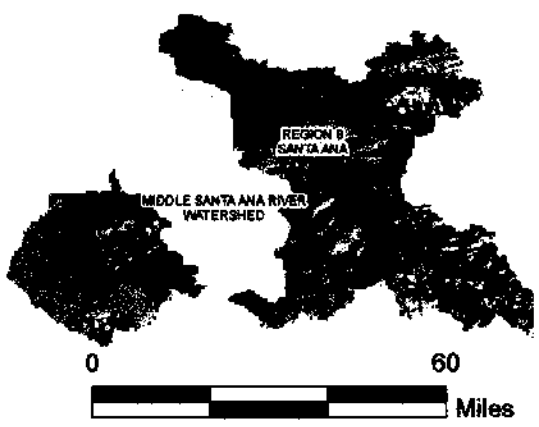
0 7.5 Miles

LAND USE

Agriculture
Open Space
Urban
Water Resource Areas

USFS area
Middle Santa Ana River Watershed
County boundary

FIGURE 3: GENERAL LAND USES IN THE MIDDLE SANTA ANA RIVER WATERSHED



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Map created November 2004
Map created by: HB

Data Sources:
Land Use: SCAG Land Use 2000 reclassified by RWQCB 8
Middle Santa Ana River Watershed: based on Calwater v. 2.2.1 boundaries (2004), Santa Ana River reach designations, and GDT streets (2002)
County: CA Spatial Information Library (2004)
USFS boundary: USDA Forest Service Geospatial Service and Technology Center (2000)

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2.4 Hydrology

The Santa Ana River is the largest river in the Santa Ana Region. It extends from its headwaters in the San Bernardino Mountains through the San Bernardino Valley and Riverside areas and into the Prado Basin and Santa Ana Canyon. Below Prado Dam, the Orange County Water District operates extensive facilities to recharge much of the flows in the River into the underlying groundwater basin, a major source of domestic supply. Flows not captured in these facilities cross the Orange County coastal plain and eventually empty into the Pacific Ocean at Huntington Beach. As identified in the 1995 Basin Plan, the mainstem of the river is divided into six reaches. Each reach is generally considered a hydrologic and water quality unit. Treated municipal wastewater, non–point source discharges, and seasonal rainfall runoff are discharged to tributaries of the Santa Ana River and to the river itself in all of the subwatersheds. Rising groundwater also contributes to the River's surface flow in the Prado Basin area and downstream. The volume of surface water flows in the Middle Santa Ana River Watershed waterbodies depends on the local precipitation and hydrology.

Climate in the Middle Santa Ana River Watershed is classified as semi-arid Mediterranean. The summers are hot and dry and most of the precipitation falls in the winter months from November to March.

2.4.1 Recycled Water Discharges

The hydrologic system in the Middle Santa Ana River Watershed is dominated throughout most of the year by discharges of recycled water from publicly- owned wastewater treatment works (POTWs). Approximately 131 MGD of wastewater are discharged from these facilities, and during the dry summer months, these discharges can constitute up to 90% or more of the flow in Reach 3 of the Santa Ana River. POTW discharges are regulated by the Regional Board through NPDES permits, which include a total coliform discharge limit of 2.2 MPN[2] organisms/100ml[3] (see also Section 3, below). Discharges from wastewater treatment facilities within the Middle Santa Ana River Watershed are summarized in Table 2, below.

2.4.2 Rising Groundwater

Rising groundwater in the Riverside Narrows area and within the Prado Basin comprises a smaller portion of baseflow. Wildermuth Environmental Inc., estimated rising groundwater in the Riverside Narrows area to be relatively constant at 14 cfs (Wildermuth Environmental, 2002). Rising groundwater in the Prado Basin is more seasonally affected, as shown in Figure 4, and can range from 1 cfs during the summer months up to 80 cfs during the winter months.

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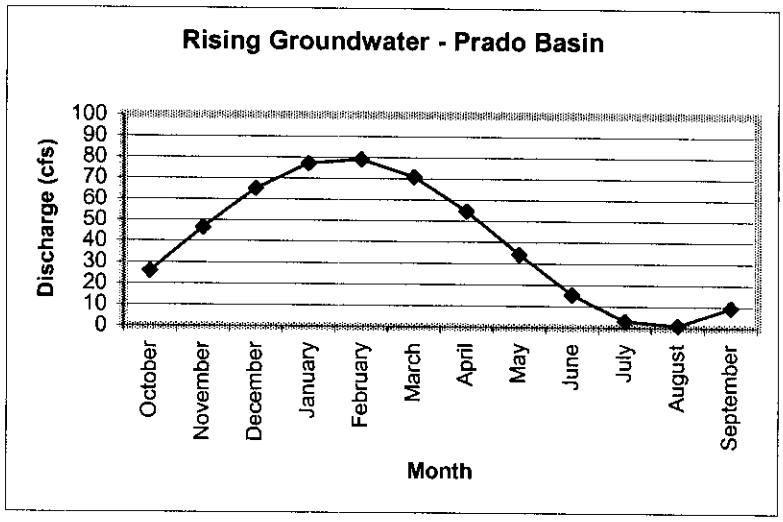
[2] MPN=Most Probable Number

[3] Certain NPDES permits also specify a total coliform limitation of 23 MPN/100 ml that applies when the wastewater discharged to the receiving water receives at least 20:1 dilution by natural receiving waters (not other POTW effluent that may be discharged upstream). As a practical matter, application of this less stringent limitation has been rare: to date, it has been invoked by only one POTW on one occasion.

Figure 4 – Rising Groundwater in Prado Basin



Source: Wildermuth Environmental, 2002

Table 2 – Wastewater Treatment Facilities in the Middle Santa Ana River Watershed

Operator	Stakeholder Agencies			
Inland Empire Utilities Agency	- City of Chino Hills - City of Ontario - City of Chino	- City of Montclair - City of Upland - City of Rancho Cucamonga		
	Discharge Facility	**Location**	**Daily Discharge**	**Receiving Waters**
	A. Regional Plant No. 1 (RP–1)	Ontario	30 MGD	Cucamonga Creek, Valley Reach near Riverside Dr overpass
	B. Regional Plant No. 1 (RP–1)	Ontario	8 MGD	Prado Park Lake
	C. Regional Plant No. 4 (RP–4)	Rancho Cucamonga	3.5 MGD	Secondary sludge from RP–4 is piped to RP–1 for treatment. Treated effluent from RP–4 is piped to RP–1 and discharged with RP–1 effluent.
	D. Regional Plant No. 5 (RP–5),	Chino	3.5 MGD	Chino Creek, Reach 1 through RP–2 discharge system
	E. Carbon Canyon Wastewater Reclamation Facility (CCWRF)	Eastern Chino	8.1 MGD	Chino Creek, Reach 2 near Central Ave overpass
Operator	**Stakeholder Agencies**			
Colton San Bernardino Regional Tertiary Treatment and Water Reclamation Authority	- City of Colton - City of San Bernardino			
	Discharge Facility	**Location**	**Daily Discharge**	**Receiving Waters**
	Regional Tertiary Treatment Rapid Infiltration and Extraction Facility (RIX)	Colton	30 MGD	Santa Ana River, Reach 4 near Riverside Ave overpass
Operator	**Stakeholder Agencies**			
City of Riverside	- City of Riverside - Edgemont Community Services District (ECSD)	- Jurupa Community Services District (JCSD) - Rubidoux Community Services District (RCSD)		
	Facility	**Location**	**Daily Discharge**	**Receiving Waters**
	Riverside Regional Water Quality Control Plant (RRWQCP)	Riverside	32 MGD	Santa Ana River, Reach 3 near Van Buren Blvd overpass

Table 2 – Wastewater Treatment Facilities in Middle Santa Ana River Watershed (cont.)

Operator	Stakeholder Agencies			
Western Riverside County Regional Wastewater Authority	- SAWPA - JCSD - City of Norco	- Western Municipal Water District (WMWD) - Home Gardens Sanitary District (HGSD)		
	Facility	**Location**	**Daily Discharge**	**Receiving Waters**
	Western Riverside County Regional Wastewater Treatment Plant (WRCRWTP)	Unincorporated Riverside County near Norco	2.7 MGD	Santa Ana River, Reach 3 near River Road overpass
Operator	**Stakeholder Agencies**			
City of Corona	City of Corona			
	Facility	**Location**	**Daily Discharge**	**Receiving Waters**
	A. Municipal Wastewater Treatment Plant No. 1	Northwestern Corona	9.3 MGD	Butterfield Drain, which is tributary to Temescal Creek
	B. Municipal Wastewater Treatment Plant No. 2	Eastern Corona	2.75 MGD	Three evaporation – percolation ponds
	C. Municipal Wastewater Treatment Plant No. 3	Southeastern Corona	1 MGD	Temescal Creek, Reach 2 near Cajalco Road overpass

2.4.3 Nuisance and Stormwater Runoff

As indicated previously, most of the precipitation in this watershed occurs during the winter months. During an average water year, rainfall amounts can range from 16 to 20 inches. The result is increased stormwater runoff in the Santa Ana River and tributaries. Figures 5 through 20 depict runoff at Chino Creek, Cucamonga Creek and the Santa Ana River at USGS gauging stations for the following water years: 1992-1993, 1996-1997, 1997-1998, 2001-2002, and 2002–2003. In these figures, dates with arrows indicate days that water quality samples were collected from the specified waterbody. These water quality monitoring activities are discussed in Sections 3 and 5 below. Precipitation data in the watershed is presented in Appendix B. As can be seen in these figures and from the precipition data, flow in the Santa Ana River, Chino Creek and Cucamonga Creek is associated with storm water runoff typically during the winter months. Stormwater runoff from streams and creeks of the mountainous areas of the watershed is usually diverted for water supply or recharged for groundwater storage before it reaches the valley reaches of each stream or creek that is the subject of this TMDL.

The 303(d) - listed waterbodies also receive discharges of dry-season nuisance runoff from urban areas. When compared to the volume of POTW discharges or stormwater

runoff, nuisance runoff is a small percentage of the overall discharge. However, nuisance runoff may contain very high densities of bacterial indicators.

Figure 5: Stream Flow in Chino Ck @ Schaeffer Ave 1992-93

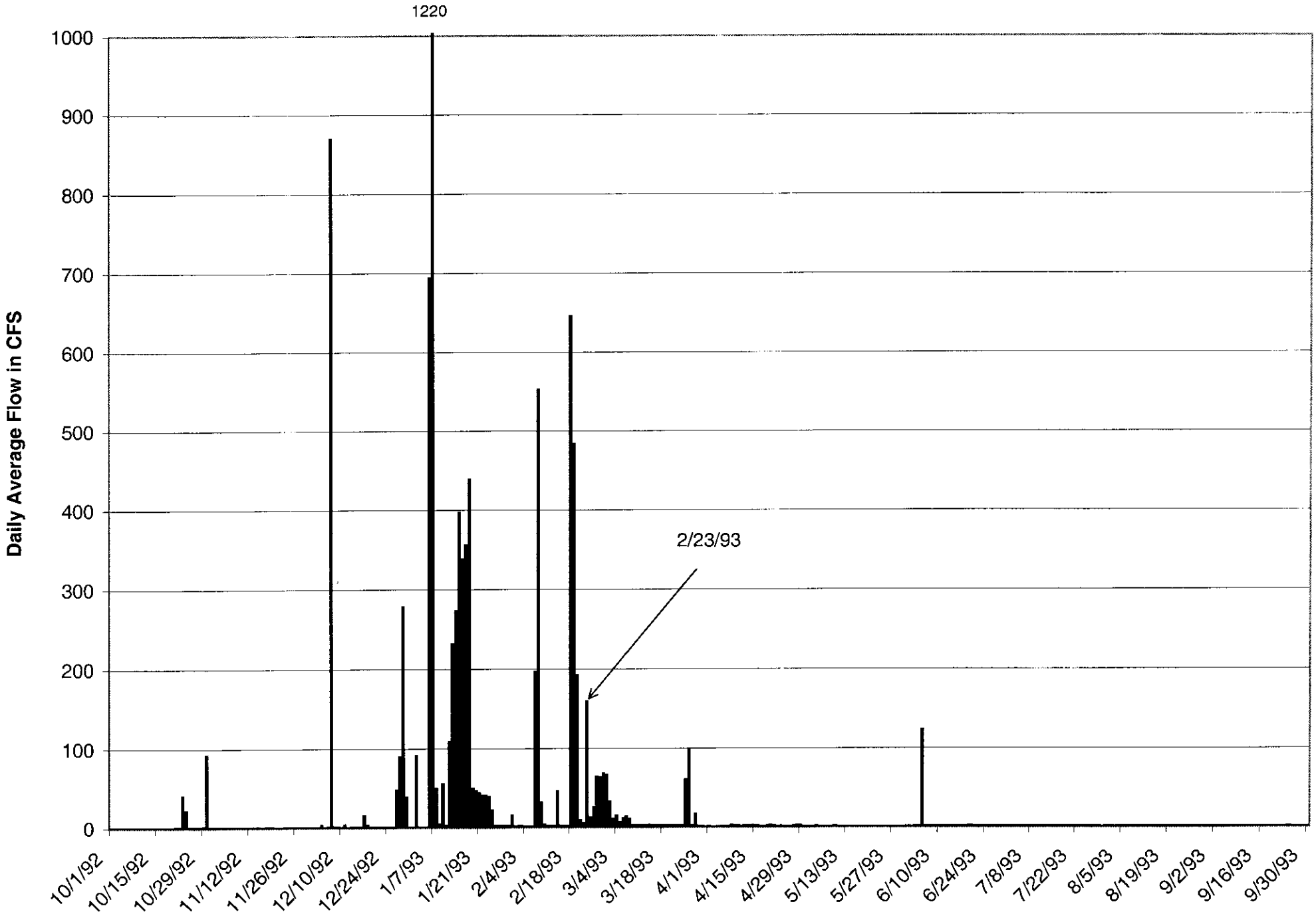


Figure 6: Stream Flow in Cucamonga Ck @ Merrill Ave 1992-93

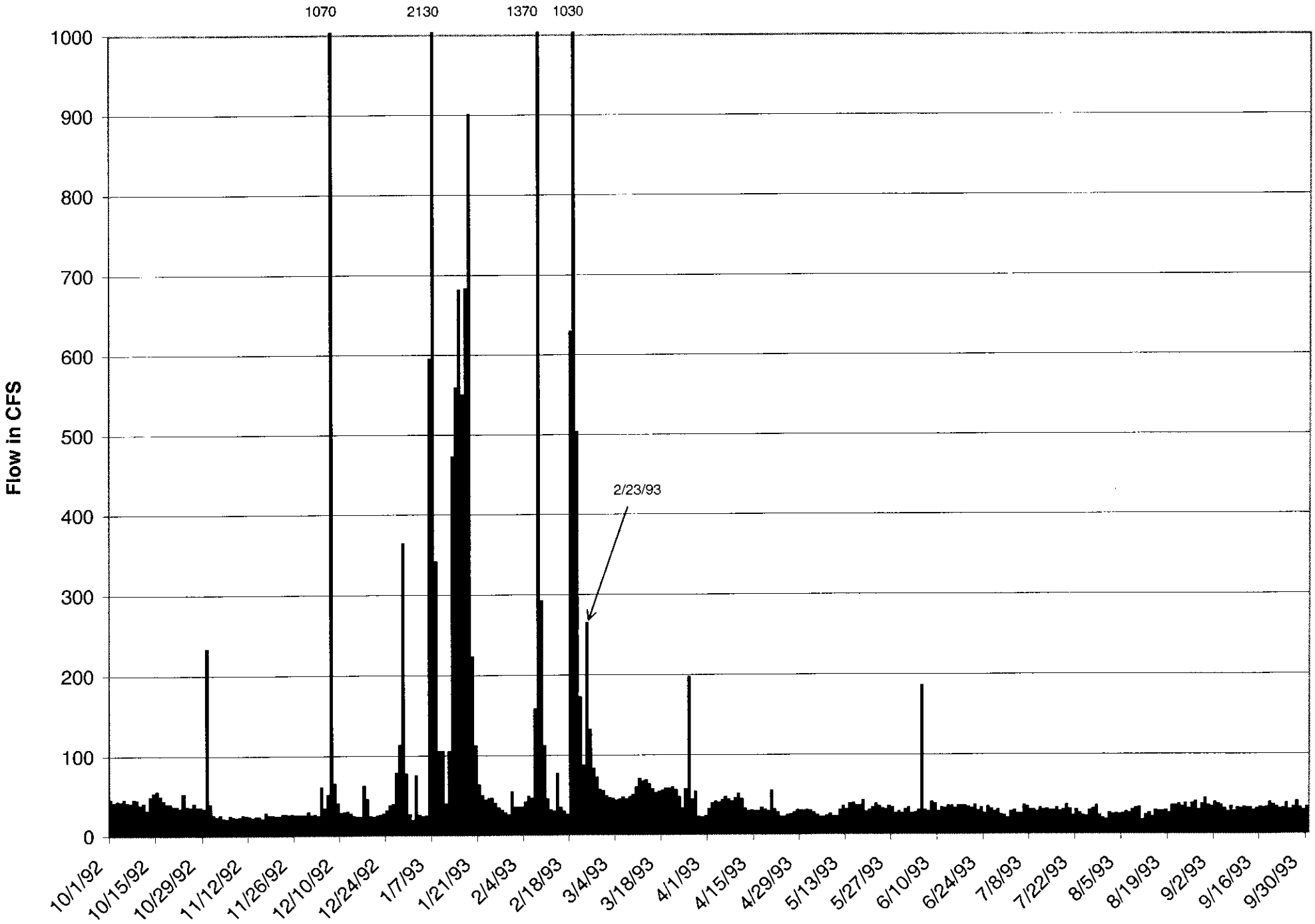


Figure 7: Stream Flow in MSAR @ MWD Xing 1992-93

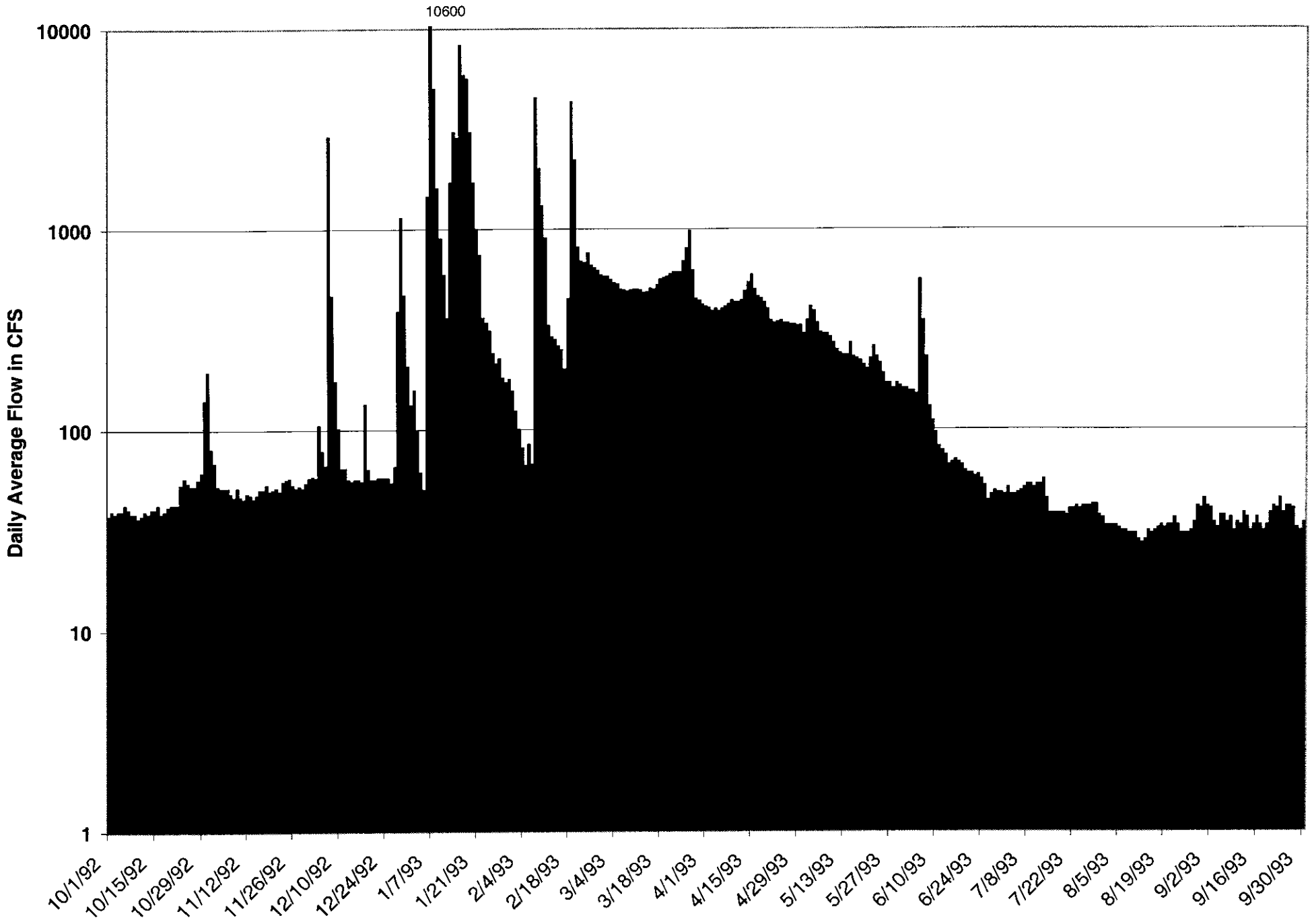


Figure 8: Chino Ck Stream Flow @ Schaeffer Ave 1996-97

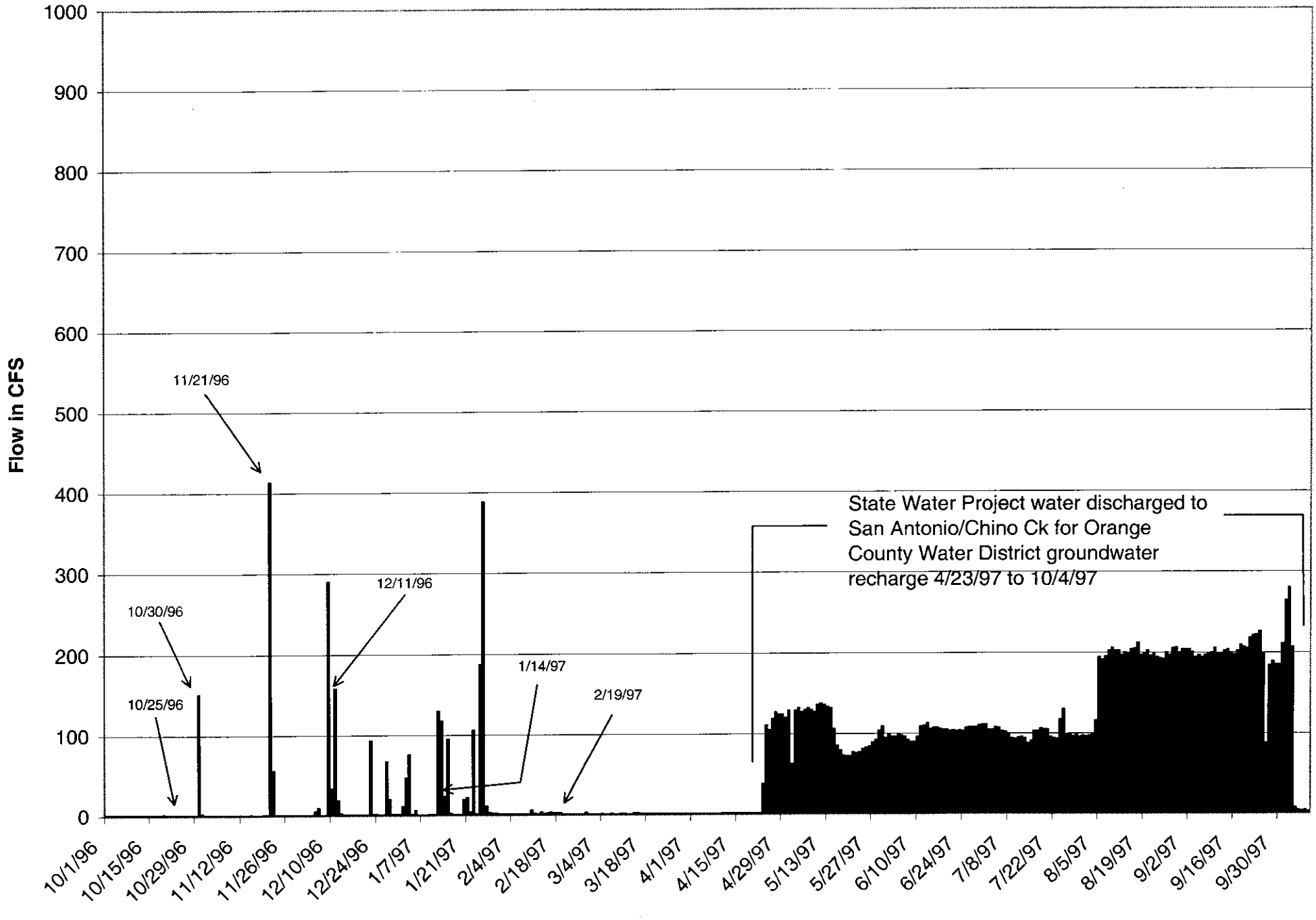


Figure 9: Stream Flow in Cucamonga Ck @ Merrill Ave 1996-97

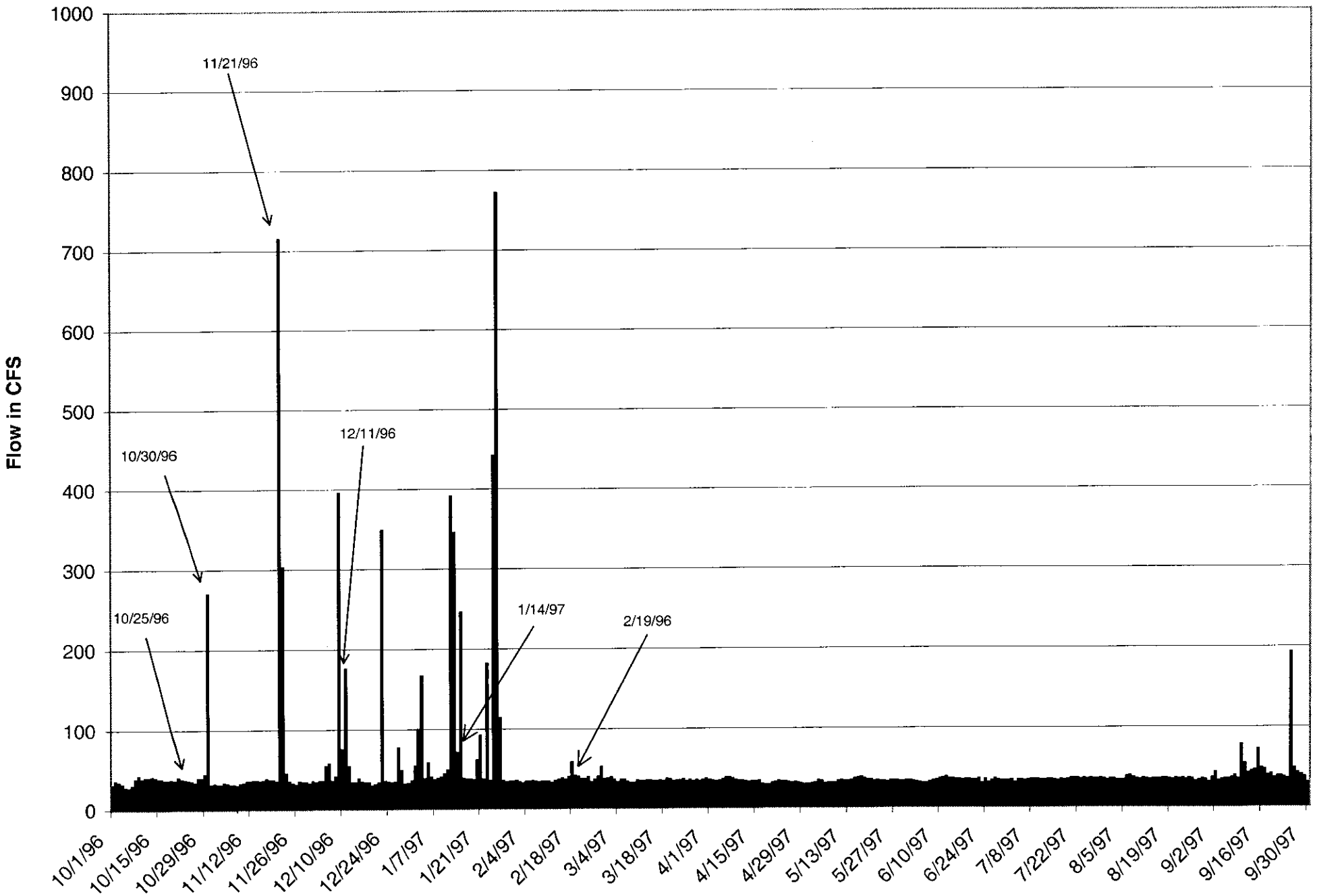


Figure 10: Stream Flow in MSAR @ MWD Xing 1996-97

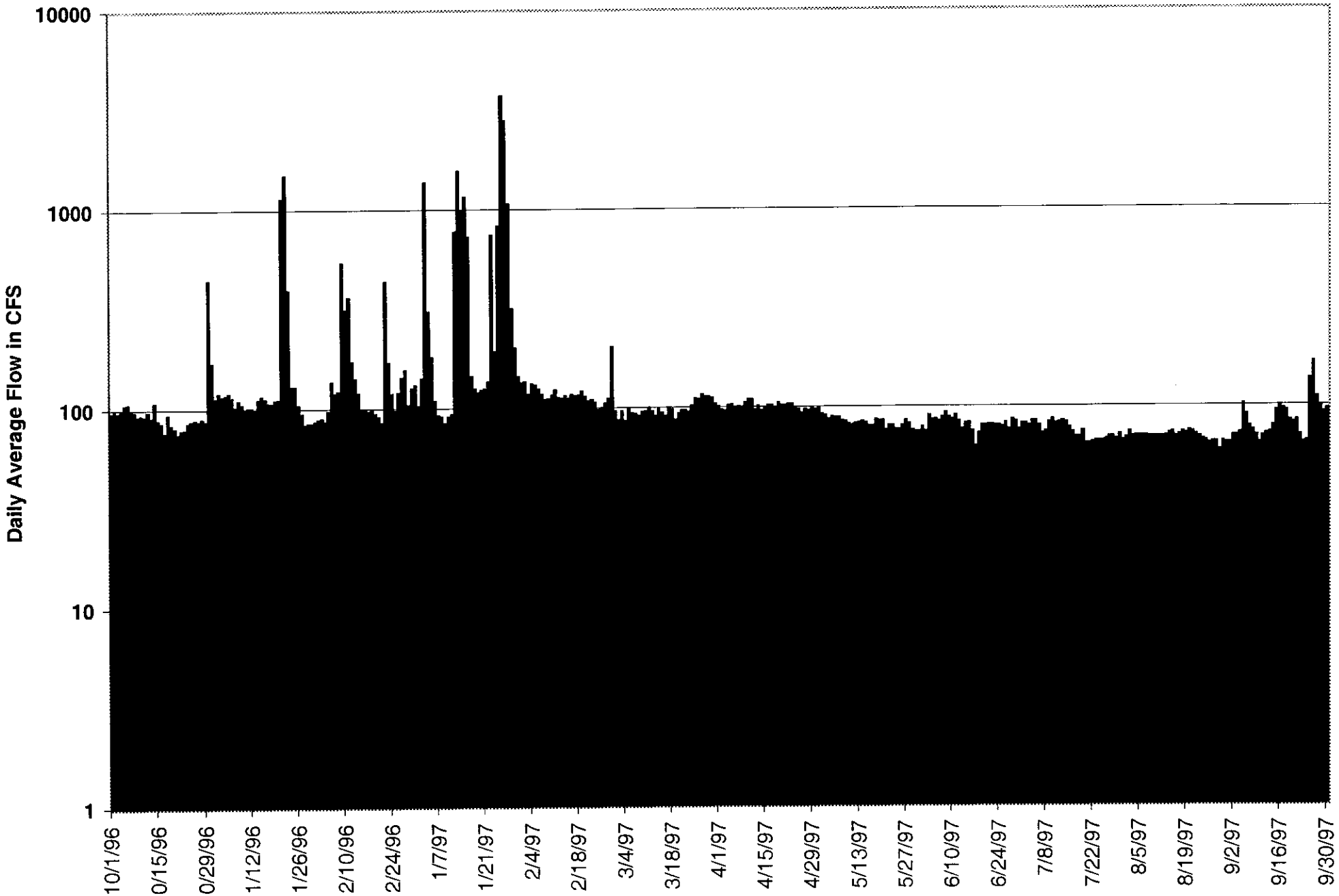


Figure 11: Chino Ck Stream Flow @ Schaeffer Ave 1997-98

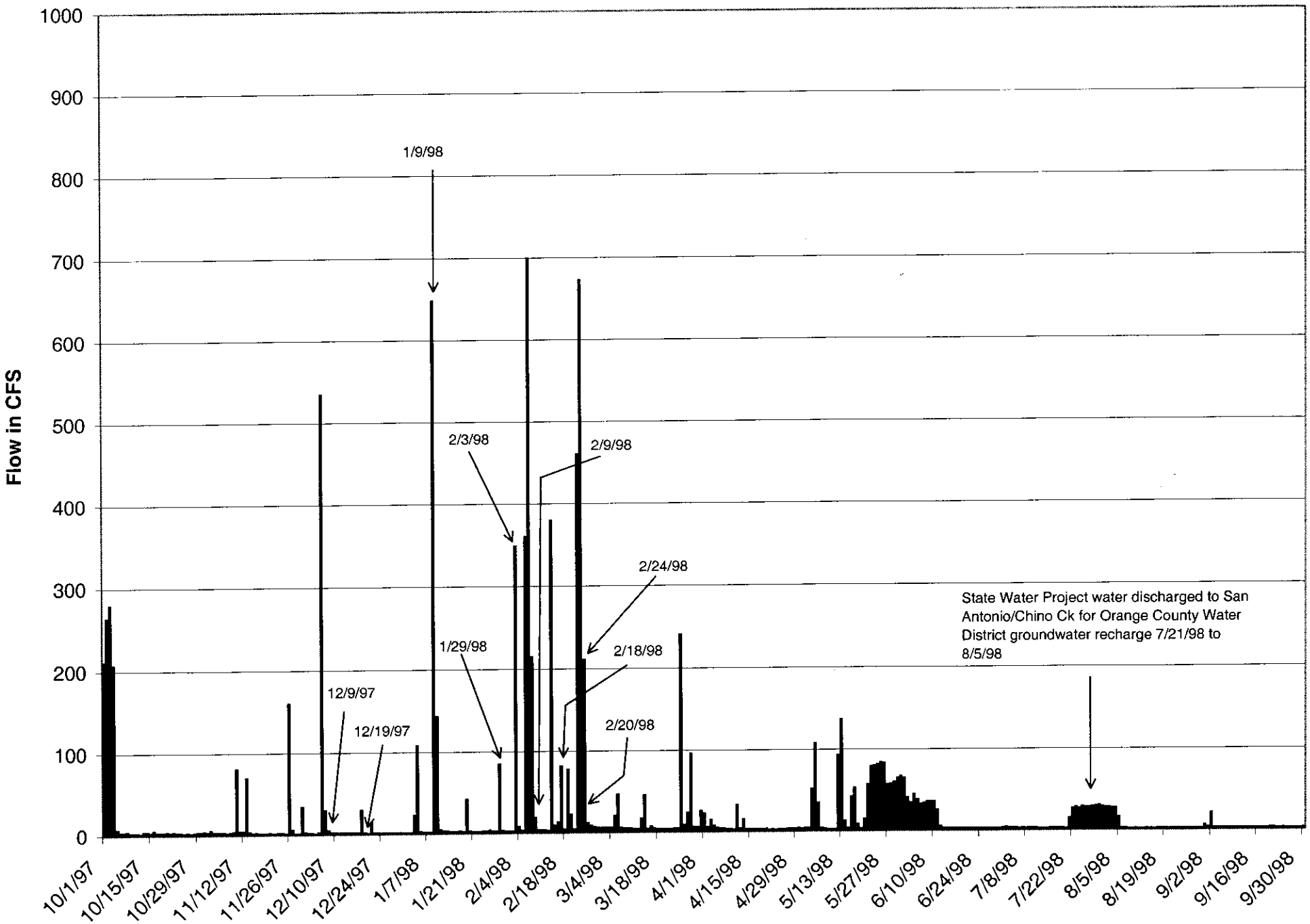


Figure 12: Stream Flow in Cucamonga Ck @ Merrill Ave 1997-98

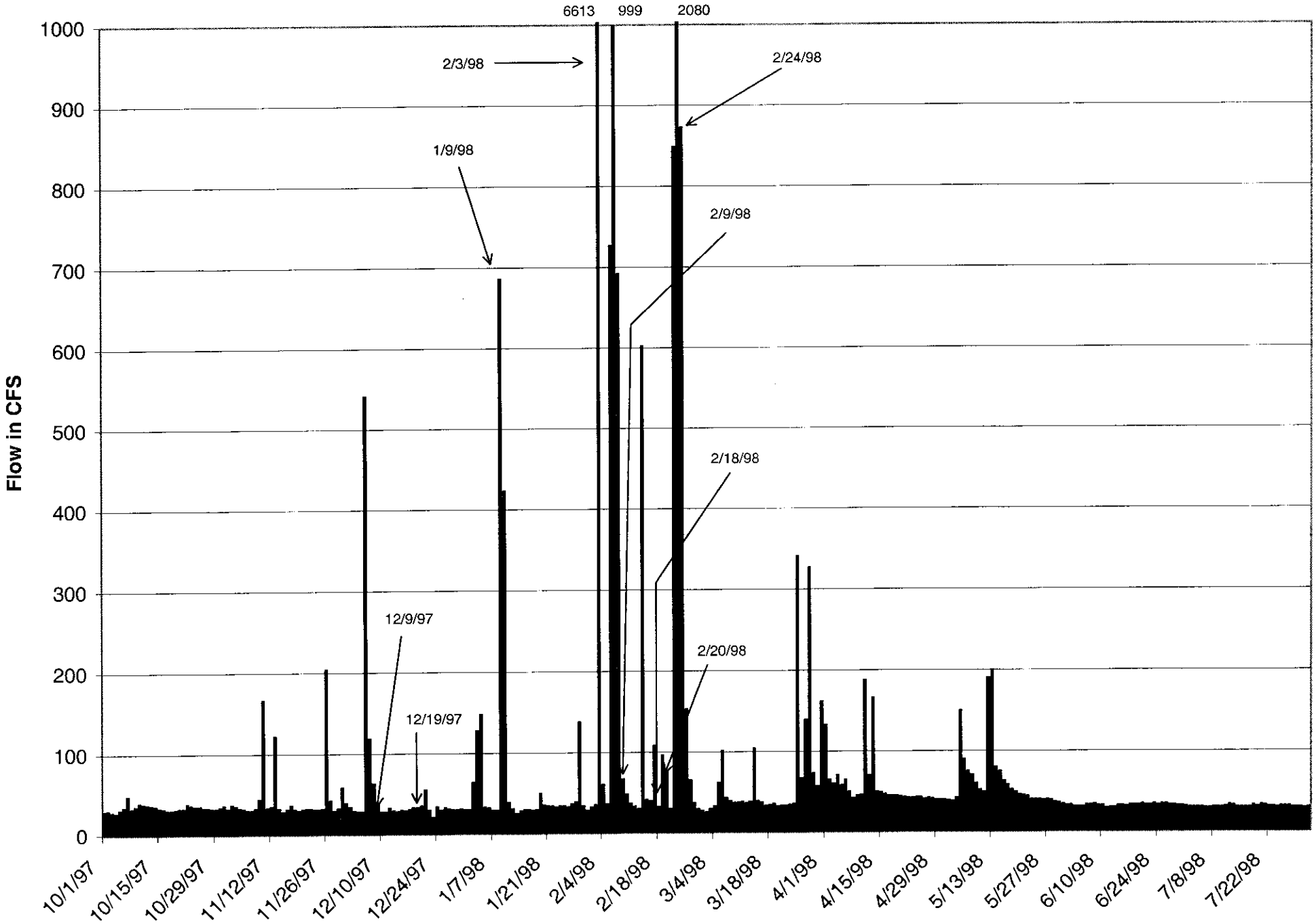


Figure 13: Stream Flow in MSAR @ MWD Xing 1997-98

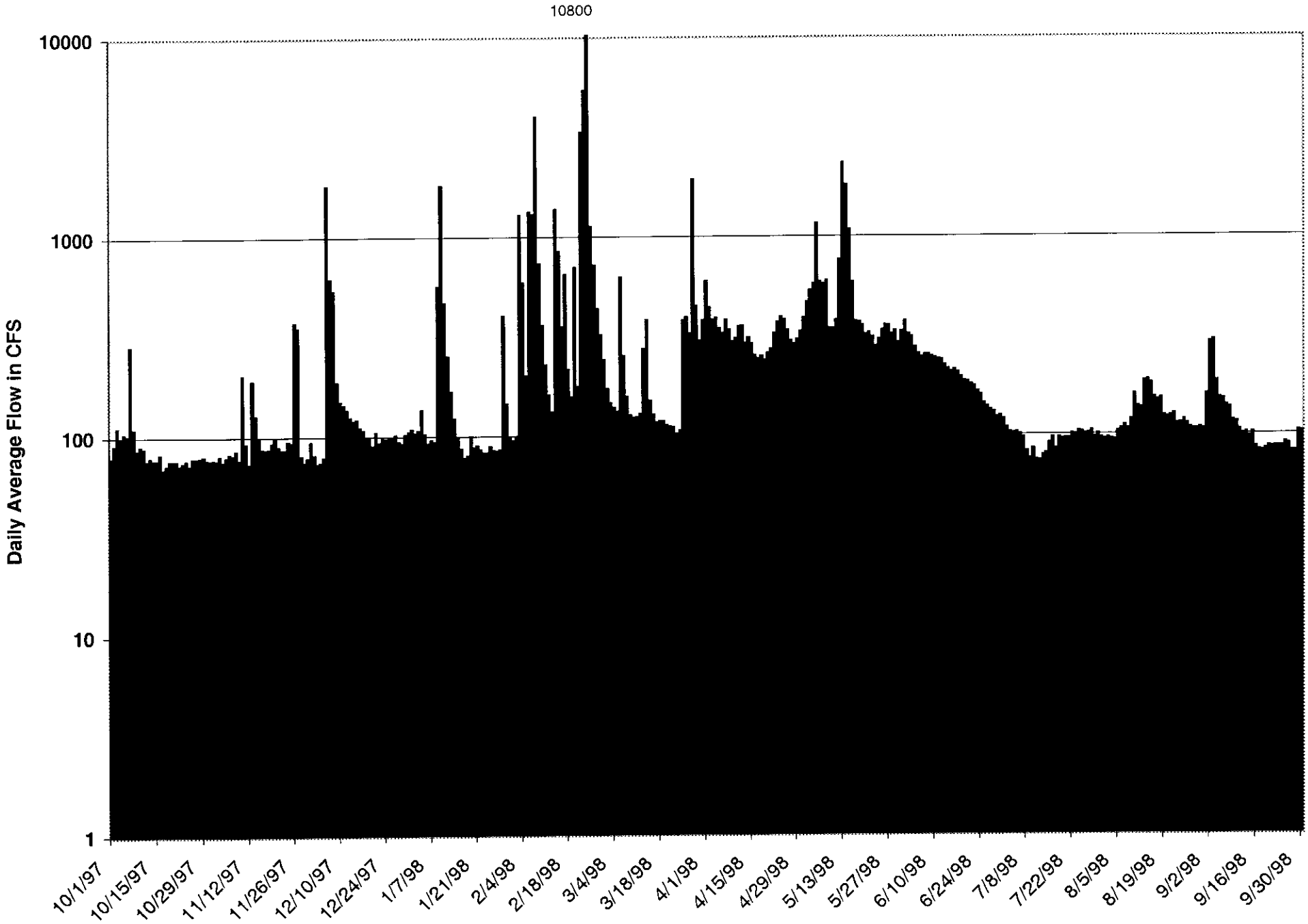


Figure 14: Stream Flow in Chino Ck at Schaeffer Ave 2001–2002

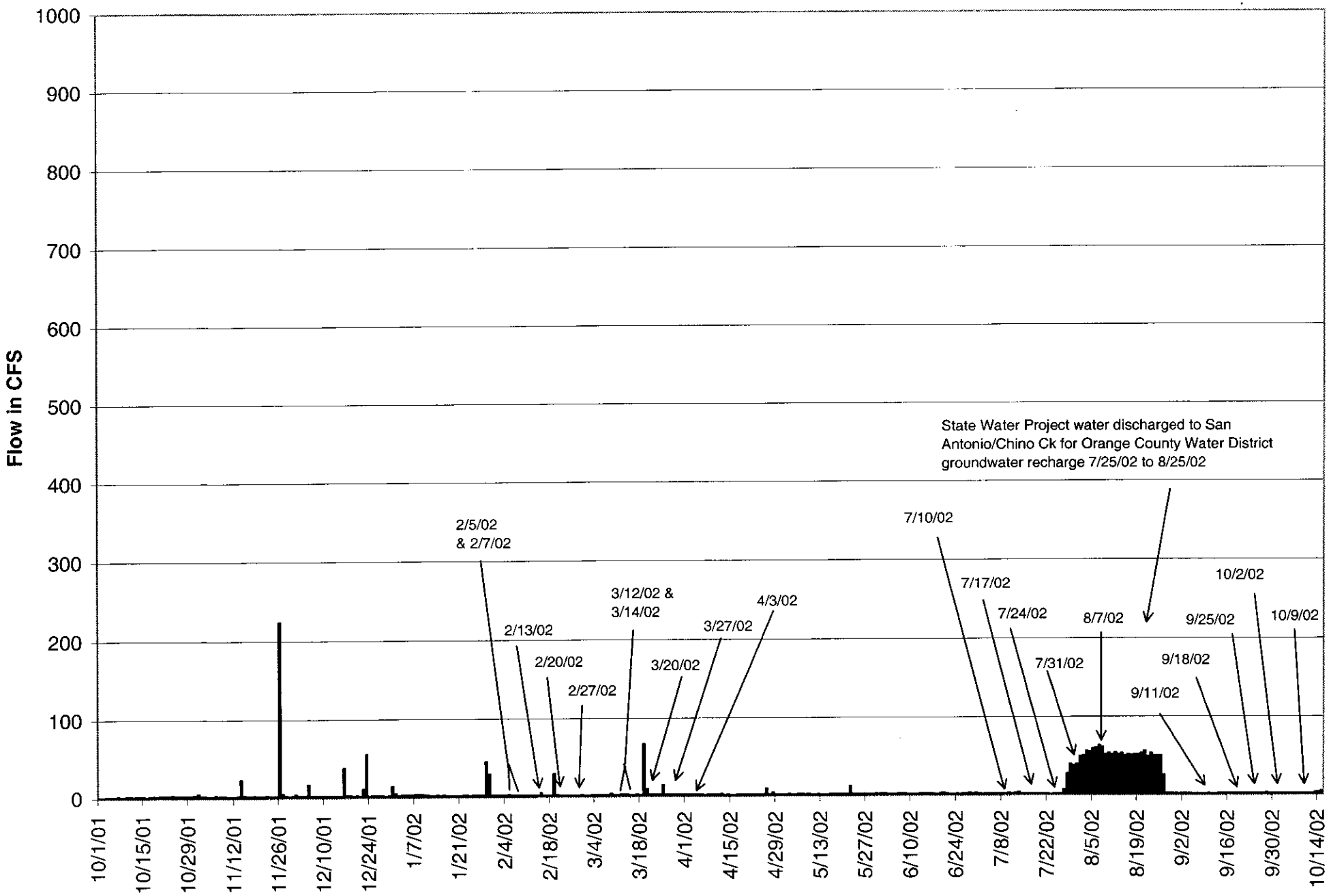


Figure 15: Stream Flow in Cucamonga Ck @ Merrill Ave 2001-02

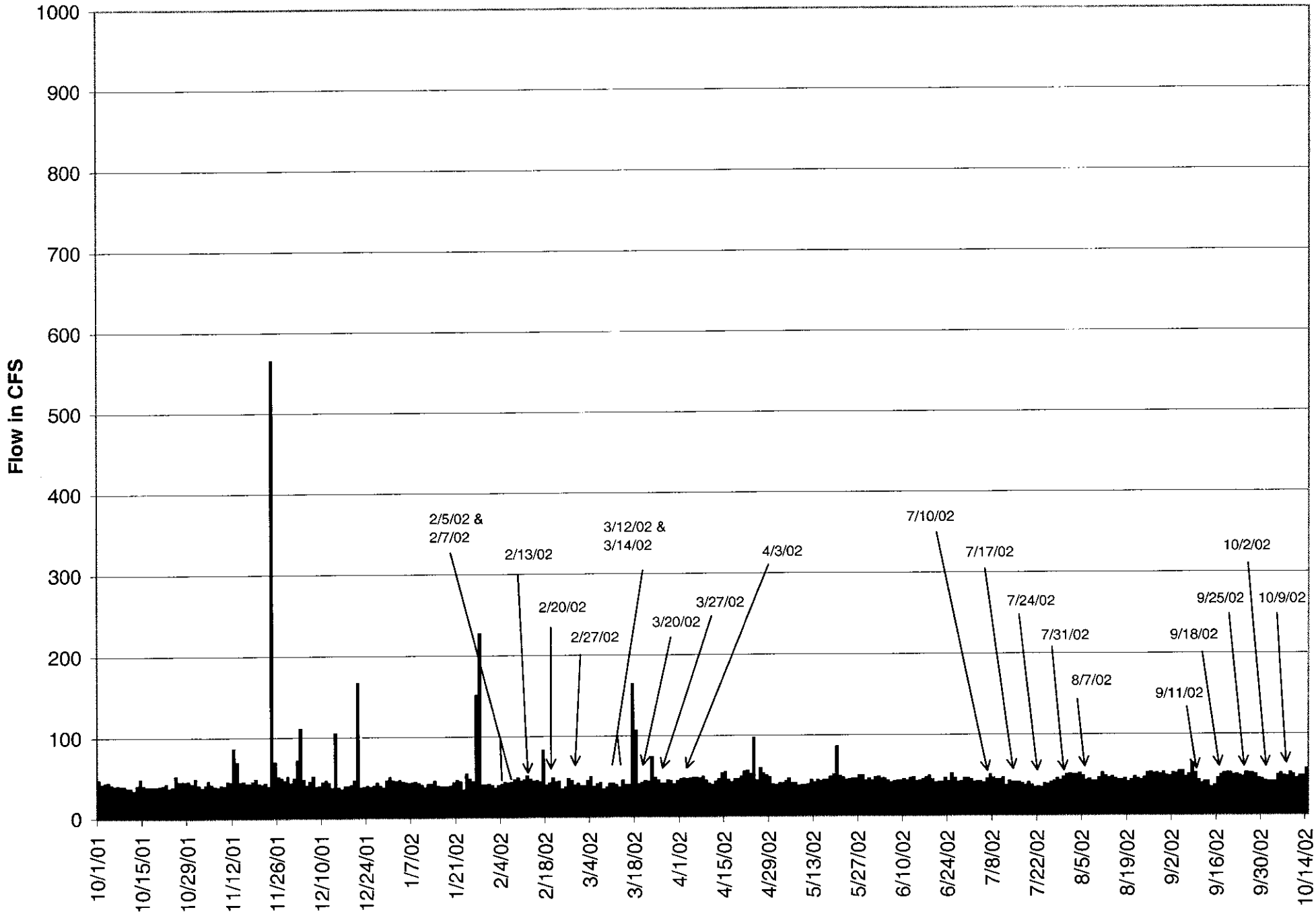


Figure 16: Stream Flow in Santa Ana River @ MWD Crossing 2001-02

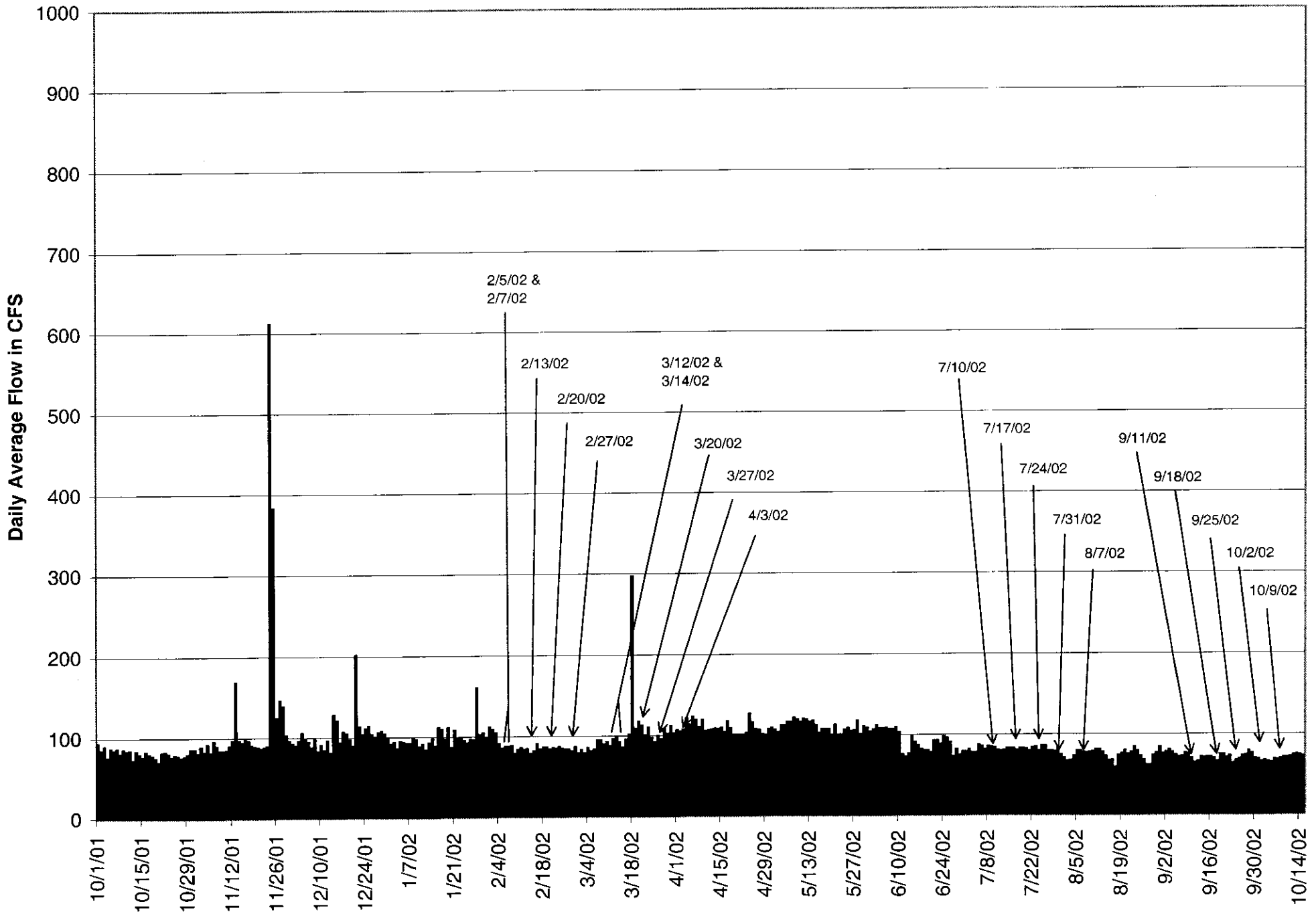


Figure 17: Stream Flow in Chino Ck @ Schaeffer Ave 2002–2003

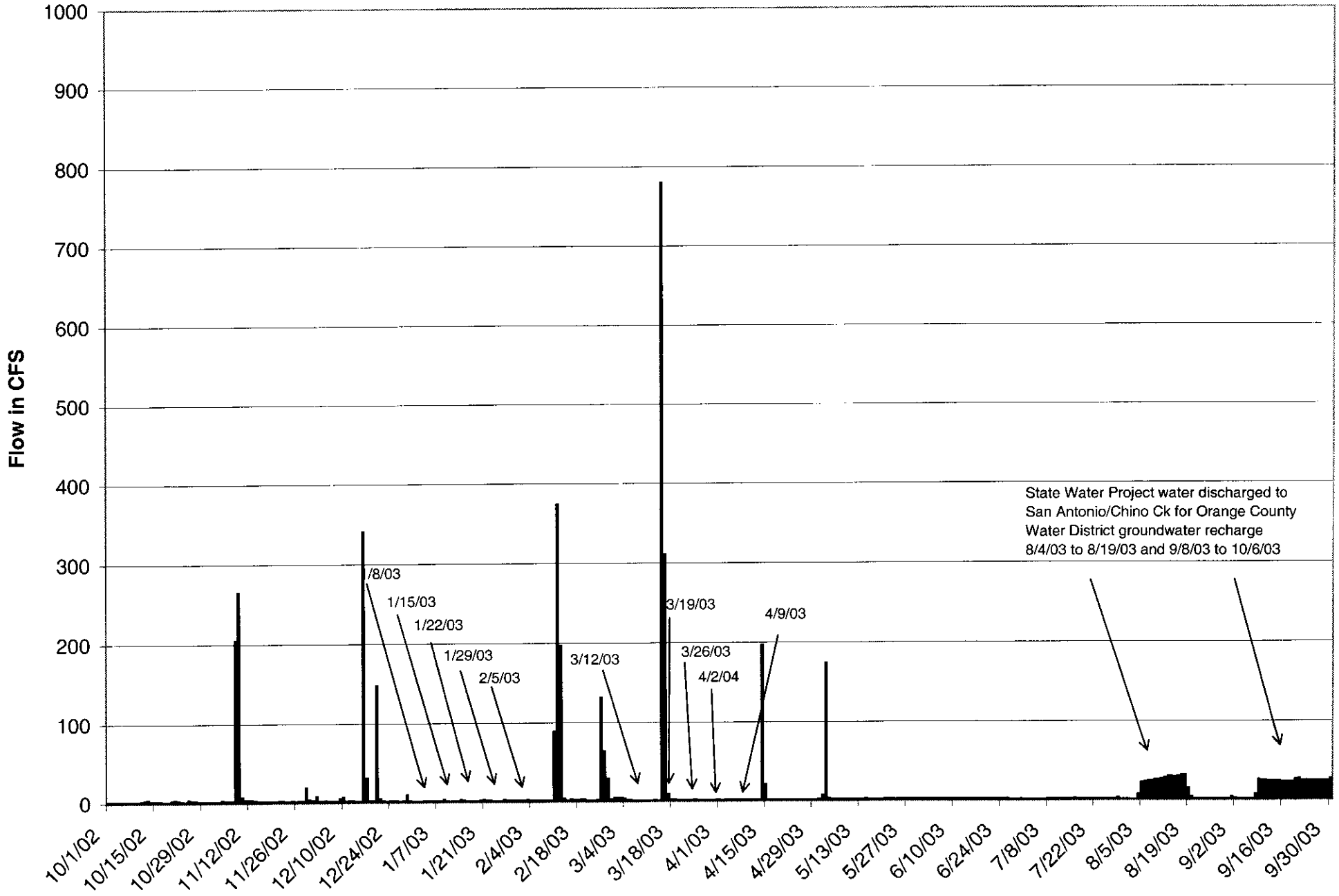


Figure 19: Stream Flow in Santa Ana River @ MWD Xing 2002-03

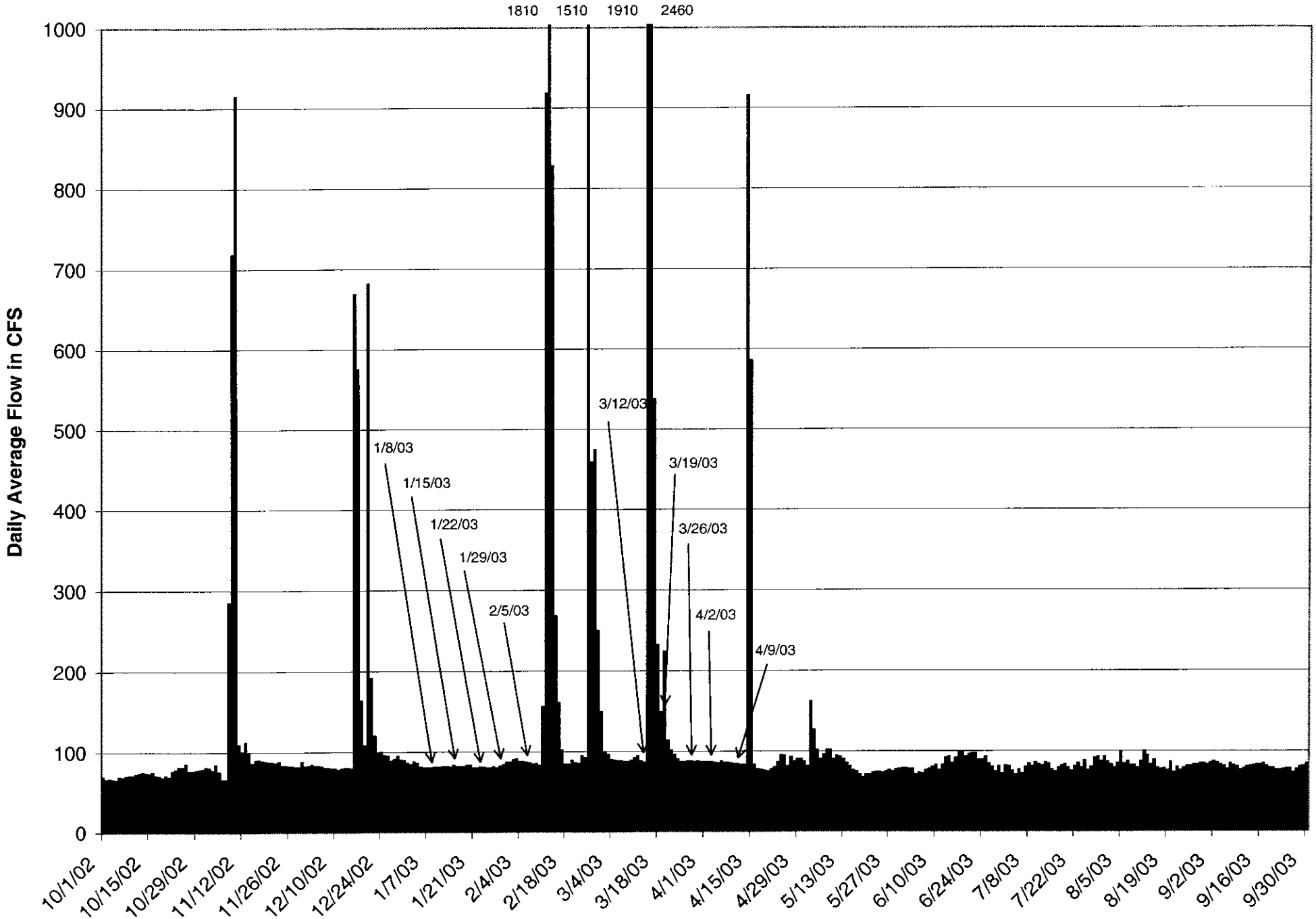
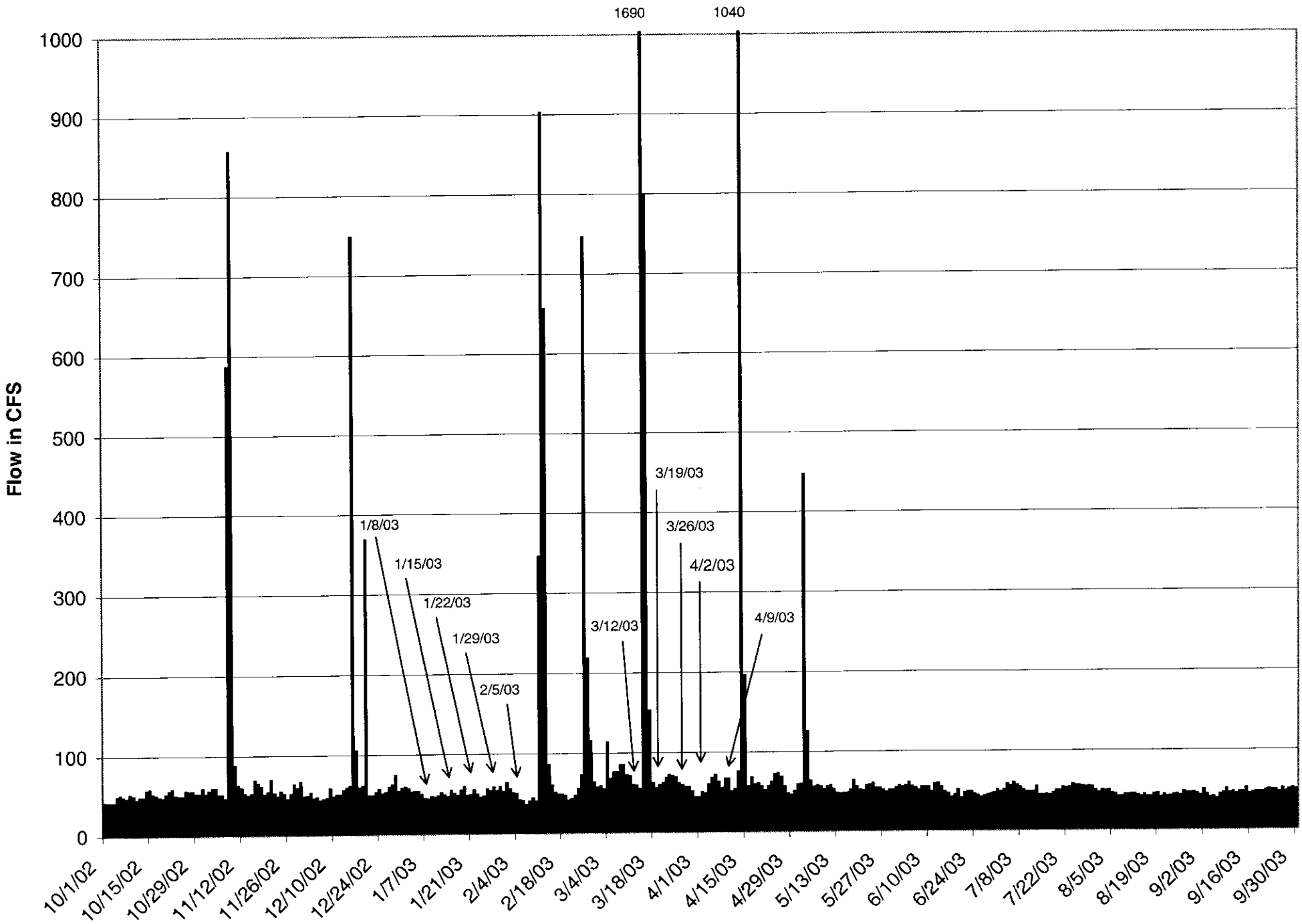


Figure 18: Stream Flow in Cucamonga Ck @ Merrill Ave 2002-03



2.5 Beneficial Uses and Water Quality Objectives

Beneficial Uses

As specified in the 1995 Water Quality Control Plan for the Santa Ana River Basin (Basin Plan), the beneficial uses of the Middle Santa Ana River water bodies included on the 303(d) list are shown in Table 3 below.

Table 3 – Beneficial Uses of Middle Santa Ana River 303(d)–Listed Waterbodies

Water Body	Beneficial Uses
Santa Ana River – Reach 3	Agriculture (AGR), Groundwater Recharge (GWR), Body Contact Recreation (REC1), Non–Body Contact Recreation (REC2), Warm Freshwater Habitat (WARM), Wildlife Habitat (WILD), Rare Species Habitat (RARE)
Chino Creek – Reach 1	REC1, REC2, WARM, WILD, RARE
Chino Creek – Reach 2	REC1, REC2, Limited Warm Freshwater Habitat (LWRM), WILD
Mill Creek – Prado Reach	REC1, REC2, WARM, WILD, RARE
Prado Park Lake	REC1, REC2, WARM, WILD, RARE
Cucamonga Creek – Reach 1	GWR, REC1, REC2, LWRM, WILD

With respect to bacterial contamination, body contact recreation (REC1) is the most sensitive beneficial use of the Middle Santa Ana River watershed waterbodies identified herein.

Water Quality Objectives

As previously stated, the Middle Santa Ana River waterbodies listed above are considered to be impaired due to high densities of bacterial indicators. Bacterial indicators, in and of, themselves are not necessarily harmful to public health. However, densities of bacterial indicators above certain levels indicate that there may be other organisms present that are harmful to public health. Such pathogens include viruses, bacteria and protozoa. The use of bacterial indicators to indicate the presence of pathogens and the potential for waterborne infectious disease is well established. It is based on the inherent difficulties in direct pathogen measurements due to the lack of readily available and affordable analytical methods and the variety of pathogens that may be present.

The primary bacterial indicator that has been used for several decades is fecal coliform. Fecal coliform is a general category of bacteria that includes the genera *Enterobacter*, *Klebsiella*, *Citrobacter*, and *Escherichia*. These genera have usually represented the majority of analytical isolations made from raw and treated municipal water supplies (APHA, et al., 1998). For inland surface waters designated as REC1, the Basin Plan specifies the following water quality objectives:

Fecal coliform: log mean less than 200 organisms/100 mL based on five or more samples per 30 day period, and not more than 10% of the samples exceed 400 organisms/100 mL for any 30–day period.

For inland surface waters designated as REC2, the Basin Plan specifies the following water quality objectives:

Fecal coliform: average less than 2000 organisms/100 mL and not more than 10% of samples exceed 4000 organisms/100 mL for any 30–day period.

These objectives apply to inland surface waters within the Region throughout the year. The Basin Plan does not distinguish fecal coliform objectives based on season, the presence of storm flows or other waterbody characteristics that may affect actual recreational uses of the waterbodies.

In the 1980's, the United States Environmental Protection Agency (USEPA) conducted studies to evaluate other indicator organisms and methods. Based upon the results of these studies, USEPA found that the results of testing for *Escherichia coli* (*E. coli*) or enterococci bacteria in freshwaters and enterococci in marine waters correlated more closely with the incidence of waterborne-infectious disease than testing for fecal coliform. USEPA's recommended national water quality criteria for bacteria are based on these indicators (US Environmental Protection Agency, 1986). USEPA recommends that states adopt water quality objectives based on the national criteria. Consideration of revised bacterial quality objectives applicable to inland surface waters in the Santa Ana Region is in progress, but no formal action to adopt revised objectives based on USEPA's national criteria has yet been proposed. (See also discussion below on the efforts of the Stormwater Quality Standards Task Force)

2.6 Storm Water Quality Standards Task Force

During the Regional Board's consideration of the Basin Plan Triennial Review list in 2002, a number of stakeholders expressed interest in supporting review and update of the bacterial quality objectives for REC1 waters, and in reviewing the REC1 designations themselves to assure their accuracy. Based on this interest and the stakeholders' commitment to provide requisite resources, the Regional Board concurred that this issue should be addressed. Stakeholders formed the Storm Water Quality Standards Task Force (Task Force). Participants include representatives from the flood control agencies from the 3 counties within the Santa Ana Region, POTW dischargers and stormwater staff from various municipalities in the watershed. Environmental groups and Board and USEPA staff are also participants.

Currently, the Task Force is in the process of evaluating REC1 beneficial uses within the Region, as well as USEPA's recommendations and requirements regarding bacterial water quality objectives (see Section 2.5). It is likely that the Task Force will recommend that the Regional Board consider adopting bacterial objectives based on USEPA's

recommended criteria. As discussed in Section 2.5, these criteria rely on bacterial indicators different from those now employed in the Basin Plan and upon which this TMDL is based. In the event that alternative bacterial objectives are adopted in the future, this TMDL will need to be revisited and revised accordingly.

2.7 Adverse Health Effects

As stated above, microorganisms in densities above certain levels in water can cause adverse health effects, including death in humans and wildlife as a result of exposure (see Table 4). Adverse health effects in humans can be grouped into four general categories: gastrointestinal; respiratory; eye, ear, and nose; and "other" (includes such problems as skin rashes). Gastrointestinal symptoms include mild to severe vomiting, diarrhea, stomachache, and nausea. Respiratory symptoms include mild to severe sore throat, cough, and chest colds. Eye, ear, and nose symptoms include mild to severe runny or stuffy nose, earache, ear discharge, and red, itchy, or watery eyes. Other symptoms include mild to severe fever, chills, skin rash, skin infections, backache, and sustained headache. These symptoms can develop individually or in combination (USEPA, 1986, and Epidemiology Resources, Inc, 1999). The correlations of *e.coli* and enterococci test results with illness rates focused primarily on gastrointestinal effects, since these effects were the most easily and obviously recognized.

Table 4 – Waterborne Pathogens, Associated Illnesses, and the Wastes They're Found In, (NRDC, 2004)

Pathogenic Agent	Effects	Source Wastes
Bacteria:		
Campylobacter jejuni	Gastoenteritis/death from Guillain–Barre syndrome	Human/animal feces
E. coli (pathogenic or enterovirulent strains)	Gastroenteritis/E. coli O157:H7, adults: death from thrombocytopenia; children: death from kidney failure	Domestic sewage
Leptospira	Leptospirosis	Animal urine
Salmonella typhi	Typhoid fever/reactive arthritis from certain strains	Domestic sewage
Other salmonella species	Various enteric fevers (often called paratyphoid), Gastroenteritis, septicemia (generalized infections in which organisms multiply in the bloodstream)	Domestic sewage, animal wastes, food, compost
Shigella dysenteriae & other species	Bacillary dystentery	Human feces, domestic sewage
Vibrio cholera	Cholera/death	Domestic sewage, shellfish, saltwater
Yersinia spp.	Acute gastroenteritis (including diarrhea, abdominal pain)/reactive arthritis	Water, milk, mammalian alimentary canal
Viruses:		
Adenovirus	Respiratory and gastrointestinal infections	Domestic sewage
Astrovirus	Gastroenteritis	Domestic sewage
Calicivirus	Gastroenteritis	Domestic sewage
Coxsackievirus	Various, including severe respiratory diseases, fevers, rashes, paralysis, aseptic meningitis, myocarditis	Domestic sewage
Echovirus	Various, similar to Coxsackievirus (evidence is not definitive except in experimental animals)	Domestic sewage
Hepatitis A	Infectious hepatitis (liver malfunction); also may affect kidneys and spleen	Domestic sewage
Norwalk and Norwalk–like Viruses	Gastroenteritis	Domestic sewage
Poliovirus	Poliomyelitis	Domestic sewage
Reovirus	Respiratory infections, gastroenteritis	Domestic sewage
Rotavirus	Gastroenteritis	Domestic sewage

Table 4 – Waterborne Pathogens, Associated Illnesses, and the Wastes They're Found In, (NRDC, 2004) (cont.)

Pathogenic Agent	Effects	Source Wastes
Protozoa:		
Balantidium coli	Dysentery, intestinal ulcers	Human/animal feces (especially swine)
Cryptosporidium parvum	Gastroenteritis/death in immuno–compromised host	Human/animal feces
Cyclospora cayetanensis	Gastroenteritis	Human feces
Dientamoeba fragilis	Mild diarrhea	Human feces
Entamoeba histolytica	Amoebic dysentery, infections of other organs	Human/animal feces, domestic sewage
Giardia lamblia	Giardiasis, diarrhea, abdominal cramps/failure to thrive, severe hypothyroidism, lactose intolerance, chronic joint pain	Human feces
Isospora belli and *Isospora hominus*	Intestinal parasites, gastrointestinal infection	
Toxoplasma gondii	Newborn syndrome, hearing and visual loss, mental retardation, diarrhea/dementia and/or seizures	Cat feces
Helminths (worms):		
Digenetic trematodes (flukes)		
Schistosoma haematobium	Schistosomiasis	Human feces
Schistosoma japanicum	Schistosomiasis	Human feces
Schistosoma mansoni	Schistosomiasis	Human feces
Echinostoma spp.	Diarrhea	Animal feces
Faxciola hepatica	Liver necrosis and cirrhosis	Animal feces
Paragonimus westermani	Paragonimiasis	Animal feces and crustaceans
Clonorchis sinensis	Bile duct erosion	Human feces, raw fish
Heterophyes heterophyes	Diarrhea and myocarditis	Human feces, raw fish
Cestodes (tapeworms)		
Diphyllobothrium latum	Diarrhea and anemia	Human feces, raw fish
Taeniarhynchus saginatus	Dizziness, nausea, pain, and inappetence	Human feces, raw beef
Taenia solium	Dizziness, nausea, pain inappetence, cysticercosis	Human feces, raw pork
Echinococcus granulosus	Hydatidosis	Dog, other animal feces
Hymenolepis nana	Dizziness, nausea, pain, and inappetence	Human feces
Nematodes (roundworms)		
Trichuris trichiura	Asymptomatic to chronic hemorrhage	Human feces
Strongyloides stercoralis	Strongyloidiasis	Human feces
Necator americanus	Iron–deficiency anemia and protein deficiency	Human feces
Ancylostoma duodenale	Iron–deficiency anemia and protein deficiency	Human feces
Ascaris lumbricoides	Ascariasis	Human, pig, and other animal feces

SECTION 3 – PROBLEM STATEMENT

As previously indicated, in 1994 and 1998, several waterbodies in the Middle Santa Ana River Watershed were added to the 303(d) list of impaired waterbodies due to elevated levels of fecal coliform bacteria measured in these waterbodies. The following summarizes the data that were used to support placing the Middle Santa Ana River waterbodies on the 303(d) list. All of these historical data are tabulated in Appendix A.

3.1 Monitoring and Assessment 1986 – 1996

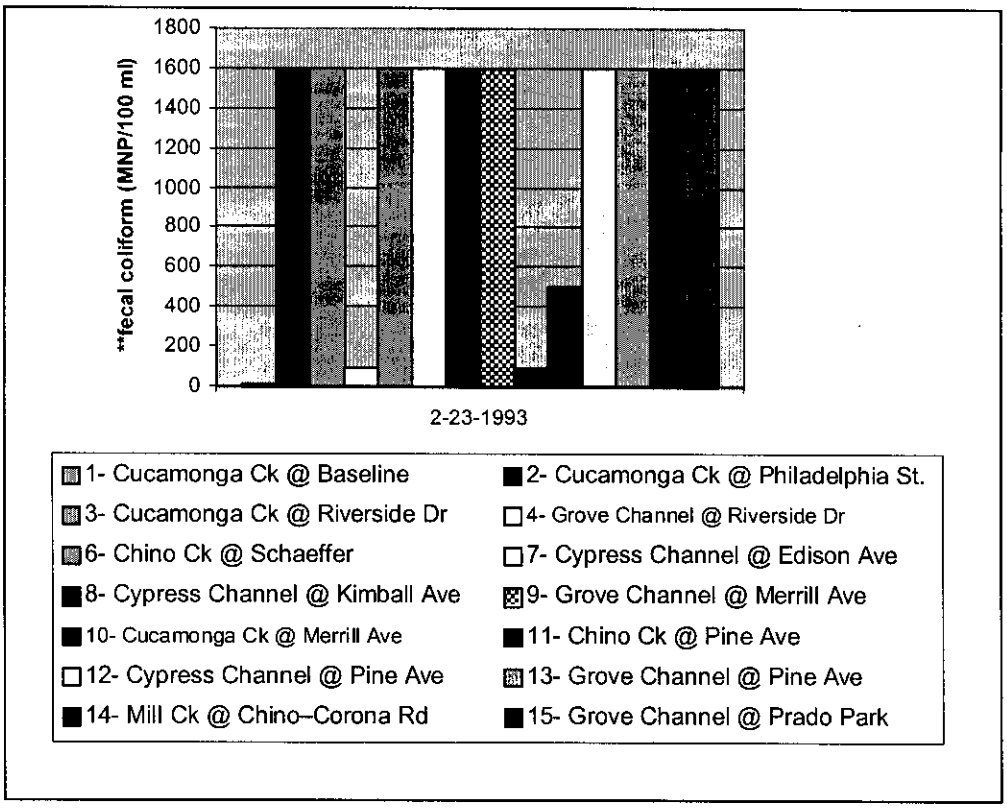
Fish kills in Prado Park Lake in 1979, 1983, and 1989 and observable discharge of waste–laden agricultural stormwater runoff raised concerns regarding the quality of Chino Creek–Reach 1, Mill Creek–Prado Area, and Prado Park Lake. The fish kills in Prado Park Lake were likely caused by waste overflows from dairy facilities in the Chino area that discharged to Chino Creek, Mill Creek and Prado Park Lake, resulting in elevated nutrient concentrations and depressions in dissolved oxygen concentrations. However, staff believed that bacteria levels were also likely to be elevated as a result of the discharge of dairy waste.

Regional Board staff collected stormwater samples in Chino Creek, Cucamonga Creek/Mill Creek at the locations shown in Table 5 on February 23,1993. As shown in Figures 5 though 20, the February storms in 1993 were among the greatest measured over the past 13-year period. The samples were analyzed for total and fecal coliform, nutrients, total suspended solids (TSS), total dissolved solids (TDS), biochemical oxygen demand (BOD), chemical oxygen demand (COD), copper, lead, and zinc. The analyses for total and fecal coliform utilized the multi-tube fermentation method. Results from these analyses are reported as most probable number (MPN) of organisms per 100ml. This method of reporting provides appropriate information for comparison to the Regional Board's REC1 fecal coliform Basin Plan Objective, which is stated in terms of organisms per 100ml. The purpose of the sample collection was to determine if wastes from dairy facilities during storm events were impacting surface waters in the Chino Basin. Fecal coliform densities measured at all locations were elevated; however comparison of these data with the Basin Plan fecal coliform water quality objective could not be done (only one sample was collected at these locations). Based on best professional judgment (BPJ), Regional Board staff recommended that the Regional Board add these waterbodies to the 303(d) list in 1994.

Table 5 - Chino Basin Storm Event Monitoring Sample Station Locations, 1993

Site ID	Site Location	Site ID	Site Location
1	Cucamonga Ck @ Baseline	9	Grove Channel @ Merrill Ave
2	Cucam Ck @ Philadelphia St.	10	Cucam Ck @ Merrill Ave
3	Cucam Ck @ Riverside Dr	11	Chino Ck @ Pine Ave
4	Grove Channel @ Riverside Dr	12	Cypress Channel @ Pine Ave
6	Chino Ck @ Schaeffer	13	Grove Channel @ Pine Ave
7	Cypress Channel @ Edison Ave	14	Mill Ck @ Chino–Corona Rd
8	Cypress Channel @ Kimball Ave	15	Grove Channel @ Prado Park

Figure 20 Chino Basin Watershed
February 23, 1993 Storm Event Fecal Coliform Sampling Results*



Laboratory maximum "detection limit" for these analyses was 1600 MPN/100 ml. Actual fecal coliform densities exceeded the 1600 MPN/100 ml analytical "detection limit". To measure densities higher than 1600 MPN/100ml, the sample preparation method is modified at the beginning of the analysis; however, sampling personnel must suspect higher densities and then instruct the test laboratory to modify the procedure.

3.2 Storm Event Monitoring 1996–1998

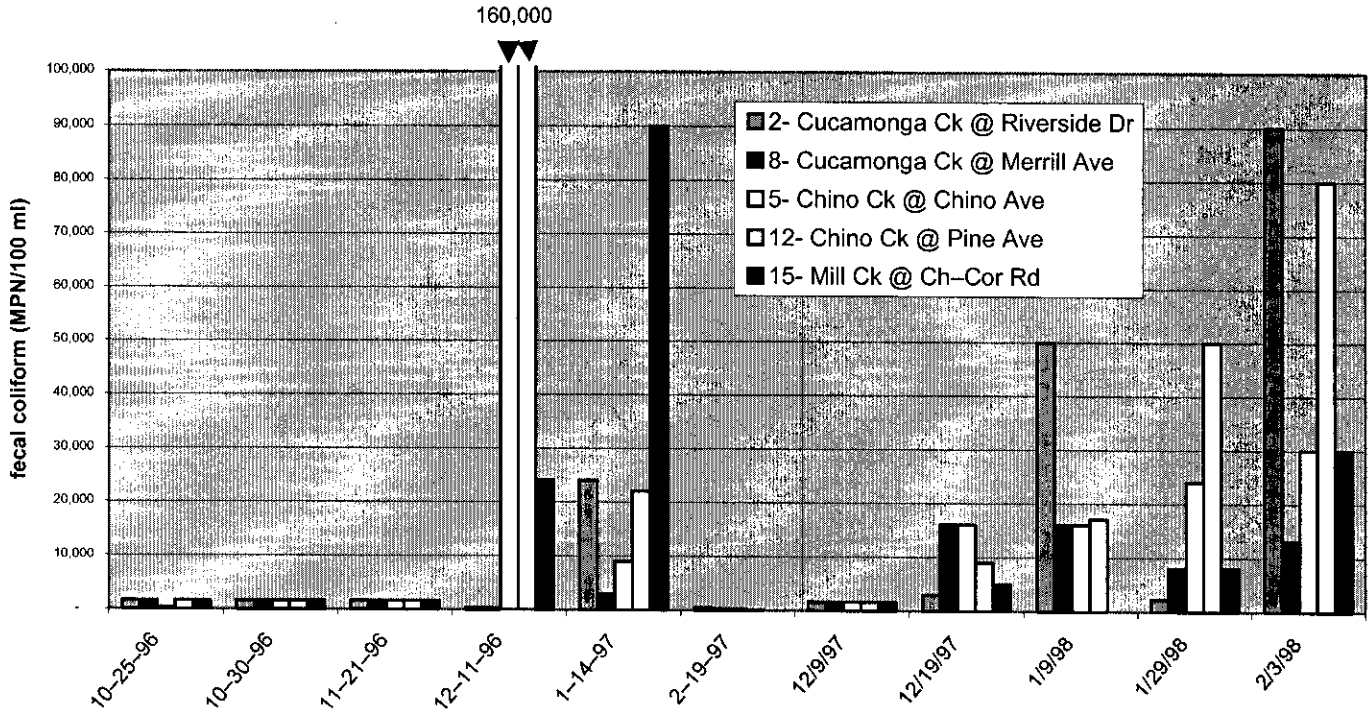
During the winters of 1996/97 and 1997/98, Regional Board staff collected water samples from the Chino Basin waterbodies shown in Table 6. A total of 6 samples were collected from most of these sites during storm events that occurred from October 1996 through February 1997; 5 storm event samples were collected from most of these sites from December 1997 through February 1998. Rainfall amounts from these storms are reflected in Appendix B. Figures 11, 12, and 13 show the increases in flows in Chino Creek, Cucamonga Creek, and the Santa Ana River resulting from these storms. As with the sampling effort in 1993, the focus of this sampling was to verify the 1993 sampling results and to evaluate bacteria densities resulting from runoff during, or immediately following, storm events. Water samples were analyzed for total coliform, fecal coliform, as well as other constituents (nutrients, TSS, TDS, BOD, COD, copper lead and zinc). Like the sampling conducted in 1993, these samples were not collected in strict adherence with the Basin Plan fecal coliform objective – that is the "5 sample per 30 day period" protocol was not followed; however, the results do show consistent trends with respect to fecal coliform densities at these sampling locations.

Results of these analyses (see Figure 21) indicated that stormwater runoff contained densities of fecal coliform that exceeded water quality objectives by several orders of magnitude. In addition, based on the same data, Chino Creek–Reach 2, and Cucamonga Creek–Reach 1 were added to the 303(d) list in 1998.

Table 6 - Chino Basin Storm Event Monitoring Sample Station Locations, 1996–1998

Site ID	Site Location	Site ID	Site Location
2	Cucam Ck @ Riverside Dr	9	Grove Channel @ Pine Ave
2a	RP–1 Effluent @ Riverside Dr	10	Euclid Channel @ Pine Ave
3	Grove Channel @ Riverside Dr	11	Cypress Channel @ Kimball Ave
4	Cypress Channel @ Riverside Dr	12	Chino Ck @ Pine Ave
5	Chino Ck @ Chino Ave	13	Cypress Channel @ Pine Ave
6	Cypress Channel @ Edison Ave	14	Grove Channel @ Prado Park
7	Grove Channel @ Merrill Ave	15	Mill Ck @ Chino–Corona Rd
8	Cucam Ck @ Merrill Ave		

Figure 21: Chino Basin Watershed
1996 through 1998 Storm Event Fecal Coliform Monitoring Results
for Selected Sampling Stations



3.3 Beneficial Use Impacts

Bacterial densities that exceed established Basin Plan objectives for REC1 use indicate the presence of pathogens at levels that pose a public health risk. REC1 use of waters where such high densities are measured is considered impaired. During the 2001 through 2004 time period, Board staff have observed, and have received anecdotal reports of, people using the subject waterbodies, or waterbodies immediately downstream, for recreational purposes, including full immersion swimming. This use is impaired by the high bacterial densities measured in these surface waters. Because of the exceedances of REC1 bacterial quality objectives and the resulting impacts to beneficial uses, the Regional Board added the Santa Ana River, Reach 3, Chino Creek, Reaches 1 and 2, Cucamonga Creek, Reach 1 and Mill Creek (Prado Area) to the 303(d) list of impaired waterbodies.

SECTION 4 – NUMERIC TARGETS

The REC1 fecal coliform objective (see Section 2.5, above) is proposed as the numeric target for the Middle Santa Ana River watershed waterbodies since compliance with this objective in the receiving water should assure protection of this most sensitive use. Compliance with the REC1 objective would also assure compliance with bacterial objectives established in the Basin Plan for REC2 use of these waters.

It must be emphasized that this numeric target does not supplant the need to apply more stringent requirements to POTW discharges to these waters. In issuing waste discharge requirements for POTW discharges to surface waters, the Regional Board relies, in part, on the recommendations of the Department of Health Services (DHS). DHS has determined that for POTW discharges to these waters, compliance with a 2.2.MPN/100 mL total coliform limitation is generally necessary to assure that the wastewater discharged is essentially pathogen free and would not adversely affect public health and recreational use of the waters[4].

It is recognized that work is in progress to consider revision of the REC1 bacterial quality objectives applicable to inland surface waters based on EPA's national bacteria quality criteria (see Section 2.5). This work is likely to result in recommendations for the inclusion of objectives based on *E. coli* and possibly, enterococci, either as a supplement to or replacement for the fecal coliform objective. No numeric targets based on these additional or alternative indicators are proposed at this time. However, the monitoring program recommended as part of the implementation plan for this TMDL includes requirements for the collection of data on these other indicators. This TMDL will be revisited and revised as necessary to incorporate appropriate numeric targets, etc., if and when revised bacterial quality objectives are adopted and approved.

[4] As noted in Section 2.4., a less stringent total coliform limitation applies to certain POTW discharges when there is sufficient dilution of the wastewater by natural receiving waters. As a practical, operational matter, POTWs strive to comply with the 2.2 MPN/100 mL limit at all times.

SECTION 5 – TARGET AND SOURCE ANALYSIS

In order to determine the reductions needed to achieve the proposed fecal coliform numeric target and, thereby, established water quality objectives, and to allocate allowable fecal coliform inputs among the sources, it is necessary to consider all existing and potential sources, including point, non-point and background sources. In the language of federal regulations, individual Waste Load and Load Allocations for the different sources must be determined that together will result in compliance with the TMDL. In order to do this, it was necessary to characterize fecal coliform sources in the Middle Santa Ana River watershed.

The source assessment is a component of the TMDL that evaluates the type, magnitude, timing, and location of loading to an impaired waterbody. Several factors should be considered in conducting the source assessment. These factors include identifying the various types of sources (e.g., point, nonpoint, background), the relative location and magnitude of loads from the sources, the transport mechanisms of concern (e.g., runoff, infiltration), and the time scale of loading to the waterbody (i.e., duration and frequency of fecal coliform discharge to receiving waters) (US EPA, 1999). Where data were available, these factors were evaluated as part of the Middle Santa Ana River Bacterial Indicators TMDL source assessment.

To investigate the problem of pathogen impairment in the Middle Santa Ana River Watershed, Board staff convened a TMDL Workgroup in August 2001[5]. To identify the extent of pathogen impairment in the Middle Santa Ana River watershed waterbodies and potential sources of bacteria, all existing bacterial water quality data were presented to, and evaluated by the Workgroup, including the results from stormwater monitoring in 1993, 1996/97 and 1997/98 discussed above. The 1993 and 1996 through 1998 storm event data showed high densities of fecal coliform bacteria at several locations in the Middle Santa Ana River watershed. However, because of the limitations of using these data for comparison with the Basin Plan fecal coliform objective, the Workgroup concluded that these data presented only a partial understanding of the degree of fecal coliform impairment in the subject waterbodies. Further, all potential sources of fecal coliform bacteria and the seasonal or annual variations of fecal coliform were not evaluated as part of those earlier sampling studies. In light of these deficiencies with the data, the TMDL Workgroup determined that additional water quality monitoring was needed to better characterize fecal coliform densities in the 303(d) listed waterbodies, and to identify potential bacterial sources.

The Workgroup developed and implemented an extensive monitoring program in February 2002. Water samples were collected by Regional Board staff and stakeholder agency staff at 10 – 13 locations on a weekly basis during nine 30–day sampling periods. Sampling locations listed in Table 7 are shown in Figure 22. The 30–day sampling periods occurred during February, March, July and September of 2002, January and March of 2003, and from January through mid–April 2004. Samples were analyzed for bacterial indicators, including fecal coliform, total coliform,

[5] Staff from the Santa Ana Watershed Project Authority (SAWPA) served as facilitators for the TMDL Workgroup. Funding for the SAWPA facilitation effort was provided with Proposition 13 funds as well as State TMDL funds.

e.coli, and enterococcus[6]. One of the primary goals of the sampling program was to collect data at different times of the year – under dry season/baseflow conditions as well as during storm events. However, the past 2 years have been extremely dry; therefore, none of the data that was collected represents bacterial levels during storm events. As discussed in Section 5.4, this remains a significant data gap.

Results of bacterial indicator monitoring performed in 2002 – 2004 are provided in Appendix A. Daily flow data for the sampling days at selected sampling locations (where USGS gauging stations exist) are also provided. As indicated in Table 7, monitoring stations were sited at locations of potential sources of bacteria input based on representative land uses, and also at locations within the 303(d) listed waterbodies to more fully evaluate the degree of impairment under various hydrological regimes. As indicated previously, the bulk of the data that were used to support adding the waterbodies to the 303(d) list was collected during rainfall events. The monitoring program implemented beginning in February 2002 attempted to confirm the stormwater results as well as to determine bacterial loadings during low–flow conditions; however, as discussed above, no storm event data were collected during 2002 – 2004. An analysis of the results of this monitoring effort is provided below.

Potential point sources and nonpoint sources of bacteria discharged to Middle Santa Ana River watershed waterbodies evaluated as part of TMDL development are summarized in Table 8.

[6] As previously discussed, USEPA expects all states to adopt objectives based on E. *coli* and/or enterococci as microbial water quality indicators. Some other Regional Boards within the state have adopted these indicators into their Basin Plans and the Santa Ana Regional Board is currently evaluating them for use within this Region. For the TMDL monitoring program, samples were analyzed for E. *coli* and enterococci, anticipating possible future adoption of objectives based on these indicators.

Table 7– Middle Santa Ana River Watershed Bacterial Indicator TMDL Sampling Locations

ID NO.	LOCATION	REASON FOR SAMPLING
C1	Icehouse Canyon Creek	Open Space Evaluation
C2	Chino Creek @ Schaeffer Ave	Urban Runoff Evaluation
C3	Prado Park Lake Outlet Structure	Impairment Status
C4	Chino Creek @ Prado Wetlands	Impairment Status
C5	Prado Wetlands Effluent	Evaluate Contribution
C6	Chino Creek Downstream of Wetlands	Impairment Status
C7	Chino Creek @ Central Ave	Impairment Status
C8	Chino Creek @ Prado Golf Course	Impairment Status
M1	Cucamonga Creek @ CCWD Ponds	Open Space Evaluation
M2	Cucamonga Creek. @ IEUA's Regional Plant No. 1	Urban Runoff Evaluation
M3	*Bon View Ave @ Merrill (NW Corner)	Agric. Runoff Evaluation
M4	*Archibald Ave @ Cloverdale Ave	Agric. Runoff Evaluation
M5	Mill Creek @ Chino–Corona Rd.	Impairment Status
S1	Santa Ana River @ MWD Crossing	Impairment Status
S2	Santa Ana River @ Prado Dam	Impairment Status
S3	Santa Ana River @ Hamner Ave	Impairment Status

* These sampling locations are actually large street gutters that are tributary to Chino Creek Reach 1 and the Santa Ana River Reach 3, respectively.

Note: SB county line denotes R8 boundary. A portion of the MSAR watershed is outside of Region 8's boundary.

LAND USE

- Agriculture
- Open Space
- Urban
- Water Resource Areas

- Sampling Stations
- Middle Santa Ana River Watershed
- USFS area
- Lakes
- Rivers/creeks
- County boundary

C1-Icehouse Cyn

M1-Cucamonga Ck @ CCWD Ponds

M2-RP-1

C2-Schaeffer Ave

M3-Bon View & Merril

M4-Archibald & Cloverdale

C7-Central Ave

S1-MWD Xing

M5-Ch-Cor Rd

S3-Hamner Ave

C8-Prado Golf Course

C3-Prado Park

C4-Above Wetlands

C5-Wetlands Effluent

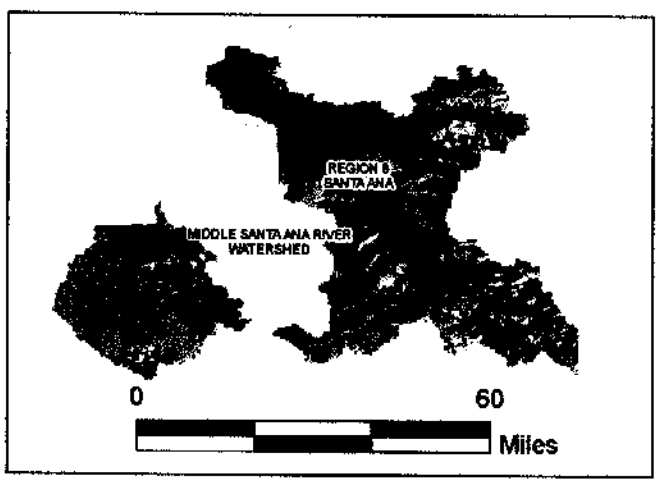
C6-Below Wetlands

S2-Below Prado Dam

N

0 3 Miles

FIGURE 22: MIDDLE SANTA ANA RIVER BACTERIAL INDICATOR TMDL SAMPLING LOCATIONS



CALIFORNIA
Water Boards
STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

Map created November 2004
Map created by: HB

Data Sources:
Sampling stations: GPS'd by RWQCB staff (2004) except Station M1
Land Use: SCAG Land Use 2000 reclassified by RWQCB 8
Middle Santa Ana River Watershed: based on Calwater v. 2.2.1 boundaries (2004), Santa Ana River reach designations, and GDT streets (2002)
County: CA Spatial Information Library (2004)
USFS boundary: USDA Forest Service Geospatial Service and Technology Center (2000)
Rivers/creeks and lakes: CA Spatial Information Library (1998)

File name: wbr_tmdl_4.mxd

TABLE 8 – MIDDLE SANTA ANA RIVER WATERSHED BACTERIAL INDICATOR SOURCE INVENTORY

SOURCE	APPLICABLE PERMIT (Principal Permittee and Permit No.)
Point Sources	
Concentrated Animal Feeding Operations	General Waste Discharge Requirements for Concentrated Animal Feeding Operations (Dairies and Related Facilities) Order No. 99-11, NPDES No. CAG018001
Urban Stormwater Runoff	1. Waste Discharge Requirements (WDRs) for the Riverside County Flood Control and Water Conservation District, County of Riverside and the Incorporated Cities of Riverside County within the Santa Ana Region, Areawide Urban Storm Water Runoff Order No. R8-2002-0011 (NPDES No. CAS 618033) 2. Waste Discharge Requirements (WDRs) for the San Bernardino County Flood Control District, County of San Bernardino and the Incorporated Cities of San Bernardino County Within the Santa Ana Region, Areawide Urban Storm Water Runoff Order No. R8-2002-0012 (NPDES No. CAS 618036) 3. NPDES Permit, Statewide Storm Water Permit and WDRs for the State of California, Department of Transportation (Caltrans) Order No. 99-06 – DWQ, NPDES No. CAS000003
Tertiary Treated Wastewater (Wastewater Treatment Plants are included here for information purposes only. As discussed in Section 2.2, wastewater treatment plants are generally held to total coliform discharge limits of 2.2 MPN – well below the proposed numeric targets. Therefore wastewater treatment plants were not evaluated as a likely bacteria source).	1. Waste Discharge Requirements for the Inland Empire Utilities Agency's Regional Plant No. 1 – Municipal Wastewater Treatment Plan, San Bernardino County Order No. 01–01, NPDES No. CA0105279 2. Waste Discharge and Producer/User Water Recycling Requirements for the Inland Empire Utilities Agency, Regional Water Recycling Plant No. 5, San Bernardino County Order No. R8–2003–0003, NPDES No. CAG8000402 3. Waste Discharge and Producer/User Water Reclamation Requirements for the Inland Empire Utilities Agency, Carbon Canyon Wastewater Reclamation Facility, San Bernardino County Order No. 99–36, NPDES No. CA8000073 4. Waste Discharge And Producer/User Reclamation Requirement for the City of Corona Wastewater Treatment Plant No. 1, Riverside County Order No. 01–55, NPDES No. CA 8000383 5. Waste Discharge Requirements for the Western Riverside County Regional Wastewater Authority, Regional Wastewater Treatment Plan, Riverside County Order No. R8–2002–0024, NPDES No. CA8000316 6. Waste Discharge Requirements for the City of Riverside's Regional Water Quality Control Plant, Riverside County Order No. 01–03, NPDES No. CA0105350 7. Waste Discharge Requirements for the Colton/San Bernardino Regional Tertiary Treatment and Water Reclamation Authority, Regional Tertiary Treatment Rapid Infiltration and Extraction Facility (RIX) Order No. 01–45, NPDES No. CA8000304
Nonpoint Sources	
Agricultural Land Runoff	None
Forest/Shrub–land/Open Space	None

5.1 Monitoring Program Results

Monitoring program results are summarized in Tables 9, 10, and 11. Note that the reporting unit for these analyses is colony forming units/100ml (CFU). CFU are the reporting units for the membrane filtration test method, which is one of the two primary test methods for bacterial indicators. As mentioned earlier, the other test method (multi-tube fermentation) provides results in terms of most probable number. Results from the two tests are roughly, though not exactly, equivalent. Either method provides adequate information for comparison to the Regional Board's bacterial indicator Basin Plan objective for REC1 beneficial uses.

The sampling data were compared to the current fecal coliform Basin Plan objective, both the 30-day logarithmic mean and the single sample maximum (see Section 2), and exceedances of these objectives were noted. The data were also compared to the Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (State Water Resources Control Board, 2004) (303(d) Listing Policy). The 303(d) Listing Policy, adopted by the State Water Resources Control Board (State Board) in August 2004, specifies the minimum number of measured exceedances required to place a water segment on the 303(d) list of impaired waterbodies. While the Policy has not been approved by the US EPA and is not yet effective, as a matter of information Board staff compared the fecal coliform data to criteria specified in the 303(d) Listing Policy in Table 3.2 - Minimum Number of Measured Exceedances Needed to Place A Water Segment on the Section 303(d) List for Conventional or Other Pollutants. This evaluation indicates whether specific waterbodies would now be placed on the 303(d) list pursuant to the Listing Policy. Based upon this evaluation, all of the subject waterbodies would still have been placed on the 303(d) list.

Table 9 – Logarithmic Means (CFU/100ml) for Fecal Coliform at Sampling Locations in Middle Santa Ana River Watershed, February 2002 to March 2004

Site ID	Sampling Site	Feb 2002	Mar 2002	Jul 2002	Sep 2002	Jan 2003	Mar 2003	Jan 2004	Feb 2004	Mar 2004
C1	Icehouse Cyn.. Creek	10	10	41	270	10	10	16	11	9
C2	Chino Ck @ Schaeffer Ave	3,400	870	2,000	340	850	1,200	220	180	83
C3	Prado Park Lake	290	220	120	410	270	480	110	80	21
C4	Chino Creek Above Wetlands	280	200	160	620	270	760	NAS	NAS	NAS
C5	Wetlands Effluent	160	210	880	1,400	420	200	NAS	NAS	NAS
C6	Chino Creek Below Wetlands	NS	110	630	560	140	NS	NAS	NAS	NAS
C7	Chino Ck @ Central Ave	NAS	NAS	NAS	NAS	NAS	NAS	150	120	200
C8	Chino Ck @ Prado GC	NAS	NAS	NAS	NAS	NAS	NAS	420	640	290
M1	Cucamonga Ck @ CCWD Ponds	10	10	25	19	10	11	9	9	9
M2	Cucamonga Ck @ RP–1	5,800	3,400	18,000	9,100	6,400	130	2,300	270	360
M3	Bon View Ave @ Merrill Ave	7,400	29,000	NS	NS	NS	NS	NS	NS	NS
M4	Archibald Ave @ Cloverdale Ave	NS	NS	NS	NS	NS	NS	NS	NS	NS
M5	Mill Creek @ Chino–Corona Road	320	140	1,200	1,300	410	880	360	210	120
S1	Santa Ana River @ MWD Xing	90	180	290	450	180	180	180	290	110
S2	Santa Ana River Below Prado Dam	110	250	530	370	54	110	40	55	25
S3	Santa Ana River @ Hamner Ave	NAS	NAS	NAS	NAS	NAS	NAS	200	330	110

Highlight number indicates that logarithmic mean exceeds water quality objective of 200 oganisms/100 mL in a 30 day period (see Section 2.5) (# of organisms is equivalent to CFUs.

CFU = Colony Forming Units

NAS = Sampling location was not part of the monitoring program during the sampling period.

NS = No samples were collected at the sampling location during the sampling period or an insufficient number of samples were collected to generate a logarithmic mean.

Table 10 – Analysis of Logarithmic Means from Bacterial Indicator TMDL Monitoring Program

Site ID	Sampling Site	Number of Logarithmic Means	Number of Logarithmic Means Greater Than 200 CFU/100ml	Percentage of Logarithmic Means Greater Than 200 CFU/100ml
C1	Icehouse Cyn. Creek	9	1	11%
C2	Chino Creek @ Schaeffer Ave	9	7*	78%
C3	Prado Park Lake Outlet Structure	9	5*	56%
C4	Chino Creek Above Wetlands	6	5*	83%
C5	Prado Wetlands Effluent	6	5*	83%
C6	Chino Creek downstream of Wetlands	4**	2	50%
C7	Chino Ck @ Central Ave	3	1	33%
C8	Chino Ck @ Prado GC	3	3	100%
M1	Cucamonga Ck @ CCWD Ponds	9	0	0%
M2	Cucamonga Ck @ IEUA RP–1	9	8*	89%
M3	Bon View Ave @ Merrill Ave	2**	2	100%
M4	Archibald Ave @ Cloverdale Ave	0**	NA	NA
M5	Mill Creek @ Chino–Corona Road	9	7*	78%
S1	Santa Ana River @ MWD Crossing	9	3	33%
S2	Santa Ana River Below Prado Dam	9	3	33%
S3	Santa Ana River @ Hamner Ave	3**	2	67%

CFU = Colony Forming Units

NA = Not applicable because an insufficient number of samples were collected at the sampling site to generate logarithmic means.

* Equals or exceeds State Water Resources Control Board 303(d) Listing Policy Criteria

** sites with insufficient samples to compare to Listing Policy Criteria

Table 11 – Summary of Individual Sampling Events from Bacterial Indicator TMDL Monitoring Program

Site ID	Sampling Site	Total Number of Samples	Number of Samples w/Densities Greater than 400 CFU/100 ml	Percentage of Samples w/Densities Greater than 400 CFU/100 ml
C1	Icehouse Cyn. Creek	43	1	2%
C2	Chino Ck @ Schaeffer Ave	45	27*	60%
C3	Prado Park Lake Outlet Structure	42	5*	12%
C4	Chino Creek Above Wetlands	30	9*	30%
C5	Prado Wetlands Effluent	30	16*	53%
C6	Chino Creek downstream of Wetlands	17	11*	65%
C7	Chino Ck @ Central Ave	15	1	7%
C8	Chino Ck @ Prado GC	15	9*	60%
M1	Cucamonga Ck @ CCWD Ponds	44	0	0%
M2	Cucamonga Ck @ RP–1	45	36*	80%
M3	Bon View Ave @ Merrill Ave	13	13	100%
M4	Archibald Ave @ Cloverdale Ave	0**	0	0%
M5	Mill Creek @ Chino–Corona Road	45	21*	47%
S1	Santa Ana River @ MWD Xing	44	8*	18%
S2	Santa Ana River Below Prado Dam	45	14*	31%
S3	Santa Ana River @ Hamner Ave	15	2	13%

* Equals or exceeds State Water Resources Control Board 303(d) Listing Policy Criteria

** site with insufficient samples to compare to Listing Policy Criteria

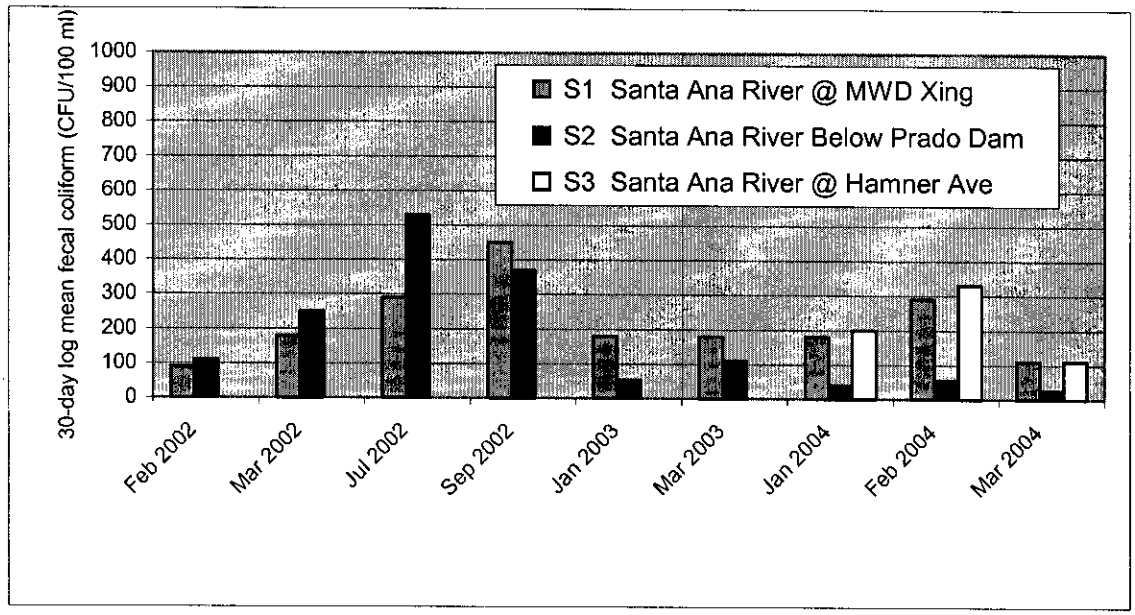
5.1.1 Santa Ana River, Reach 3

Comparison of data to Basin Plan REC-1 fecal coliform water quality objective (proposed numeric target) – To evaluate Santa Ana River, Reach 3, samples were collected at two sites during 2002 – 2004: MWD Crossing (S1), where the Metropolitan Water District of Southern California (MWD) pipeline crosses the Santa Ana River in Riverside, and the United States Geological Survey gauging station (USGS Station) located just downstream of Prado Dam (S2). A third location, where Hamner Avenue crosses the river (S3), was added in 2004 to provide information on the long segment of the river between the other two points. A sufficient numbers of samples were collected at MWD Crossing and at the USGS Station to generate fecal coliform logarithmic means for nine 30–day periods at each location. Logarithmic means were generated for three 30–day periods at location Hamner Avenue (S3).

As shown in Table 10 and in Figure 23, the logarithmic means at MWD Crossing and at the USGS Station exceeded the water quality objective three of the nine 30–day periods, with two of these three sampling periods occurring during summer months (July and September 2002) when people are more likely to use the river for recreational activities. In addition, individual samples at MWD Crossing exceeded the single sample maximum of 400 CFU/100ml 8 of 44 times (18%), while individual samples at the USGS Gauging Station exceeded the single sample maximum 14 of 45 times (31%) (see Table 10). The logarithmic means at Hamner Avenue exceeded the water quality objective two of the three 30–day periods, while individual samples at Hamner Avenue exceeded the single sample maximum 2 of 15 times (13%). The logarithmic means at MWD Crossing and at the USGS Station exceeded the water quality objective during both summer season 30–day periods. These results indicate impairment due to bacterial contamination during critical times when REC1 uses are likely to be the greatest. During a majority of the sampling periods, bacterial indicator concentrations were generally in compliance during the winter months (again, because the 2002 – 2004 winter periods were relatively dry, the winter month data does not represent fecal coliform densities during storm events).

Comparison with the SWRCB's 303(d) Listing Policy Criteria– As shown in Table 10, based on 30-day logarithmic mean fecal coliform data, none of the Santa Ana River, Reach 3 sampling locations had the minimum number of exceedances for listing a waterbody on the 303(d) list pursuant to the 303(d) Listing Policy. However, based on the single sample sampling results (see Table 11), the Santa Ana River at MWD Crossing and the Santa Ana River below Prado Dam exceed the minimum number of exceedances for listing a waterbody on the 303(d) list. Therefore, the 2002 – 2004 fecal coliform data does point to fecal coliform impairment of the Santa Ana River, Reach 3.

Figure 23: 30-day Fecal Coliform Logarithmic Mean Densities for Bacterial Indicator TMDL Monitoring of Santa Ana River, Reach 3



5.1.2 Chino Creek, Reach 1 and Reach 2

Comparison of data to Basin Plan REC-1 fecal coliform water quality objective (proposed numeric target) Table 8 shows the sampling conducted at various locations along Chino Creek from 2002-2004. As shown, samples were collected during all nine 30-day sampling periods only at the Schaeffer Avenue site (C2) in Reach 2 of the Creek, where the United States Geological Survey operates a stream gauging station. The Reach 1 site (C4), located at Orange County Water District's Prado Wetlands just upstream of the point where the wetlands discharge into Chino Creek, was sampled during 2002 and 2003, as was the Prado Wetlands discharge to the Creek (C5). Chino Creek downstream of where the Prado Wetlands discharge to Chino Creek (C6) was sampled 3 times during 2002 and once in 2003 to assess the effect of the wetlands inflows on the quality of the Creek. At the Chino Creek downstream of the Prado Wetlands discharge (C6), a sufficient number of samples were collected to generate logarithmic means only during four 30-day periods. Finally, two additional Reach 1 locations at Central Avenue (C7) and at the Prado Golf Course (C8) just upstream of Euclid Avenue were added in 2004 to provide information on the creek between the other two points. Nine logarithmic means were generated for the Schaeffer Avenue location (C2), six logarithmic means were generated for the Prado Wetlands location and the wetlands effluent (C4 and C5, respectively), four logarithmic means were generated for the point downstream of the Prado Wetlands discharge (C6) and three logarithmic means each were generated for the Central Avenue (C7) and Prado Golf Course locations (C8).

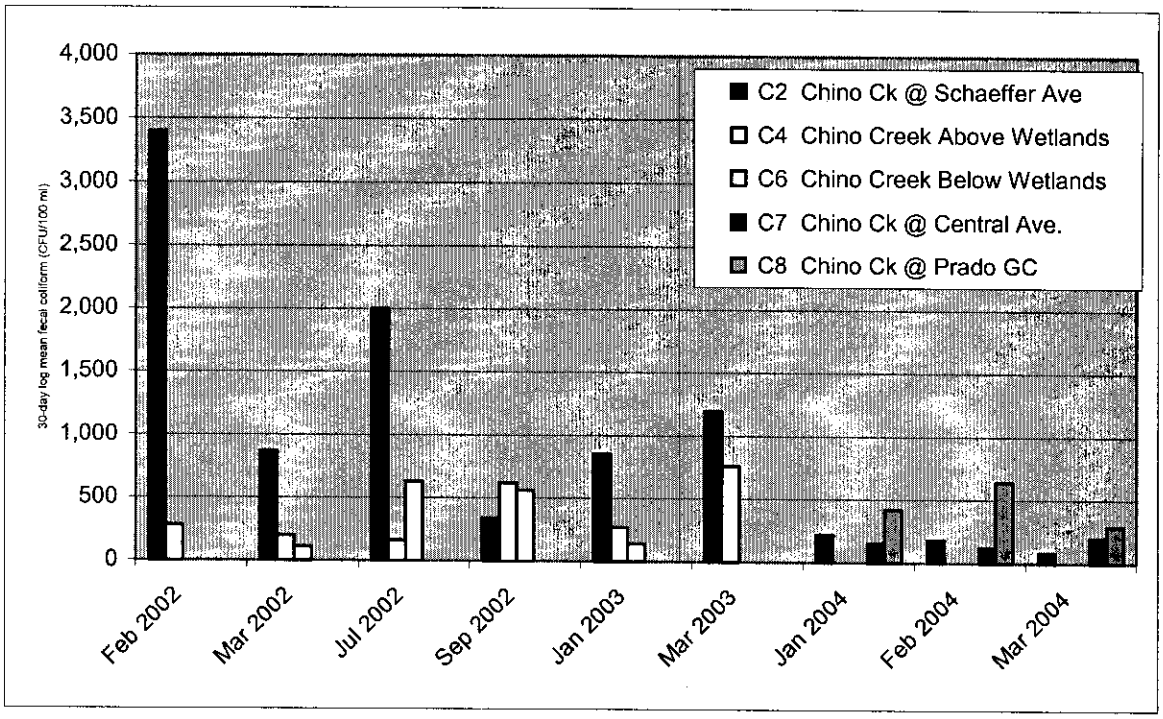
As shown in Table 10, at the Schaeffer Avenue location, logarithmic means exceeded the water quality objective seven of the nine 30–day periods, and, as shown in Table 11,

individual samples at the Schaeffer Avenue location exceeded the single sample maximum 27 of 45 times (60%). At the point upstream of Prado Wetlands discharge location, the logarithmic means exceeded the water quality objective five of six 30–day periods, and individual samples at this location exceeded the single sample maximum 9 of 30 times (30%). At the point downstream of the Prado Wetlands discharge, the logarithmic means exceeded the water quality objective two of four 30–day periods, and individual samples at this location exceeded the single sample maximum 11 of 17 times (65%). At the Central Avenue location, one of the three logarithmic means exceeded the water quality objective, and individual samples at the Central Avenue location exceeded the single sample maximum only 1 of 15 times (7%). At the Prado Golf Course location, logarithmic means exceeded the water quality objective for all three 30–day periods, and individual samples at the Prado Golf Course location exceeded the single sample maximum 9 of 15 times (60%).

Comparison with the SWRCB's 303(d) Listing Policy Criteria - As noted in Tables 10 and 11, most of the Chino Creek sampling locations exceed the 303(d) Listing Policy criteria for either the 30-day logarithmic means and/or the individual sample results.

It should be noted that for the Chino Creek downstream of Prado Wetlands sampling site and Chino Creek at Central Avenue, the sample size (< 5) was insufficient to compare the 30-day logarithmic means to the 303(d) Listing Policy criteria. Comparison of the individual sampling results for these two sampling locations shows that only the Chino Creek at the Prado Golf Course exceeds the 303(d) Listing Policy criteria. This comparative analysis confirms that the 303(d) listing of Chino Creek is appropriate.

Figure 24: 30-day Fecal Coliform Logarithmic Mean Densities for TMDL Monitoring of Chino Creek, Reaches 1 and 2



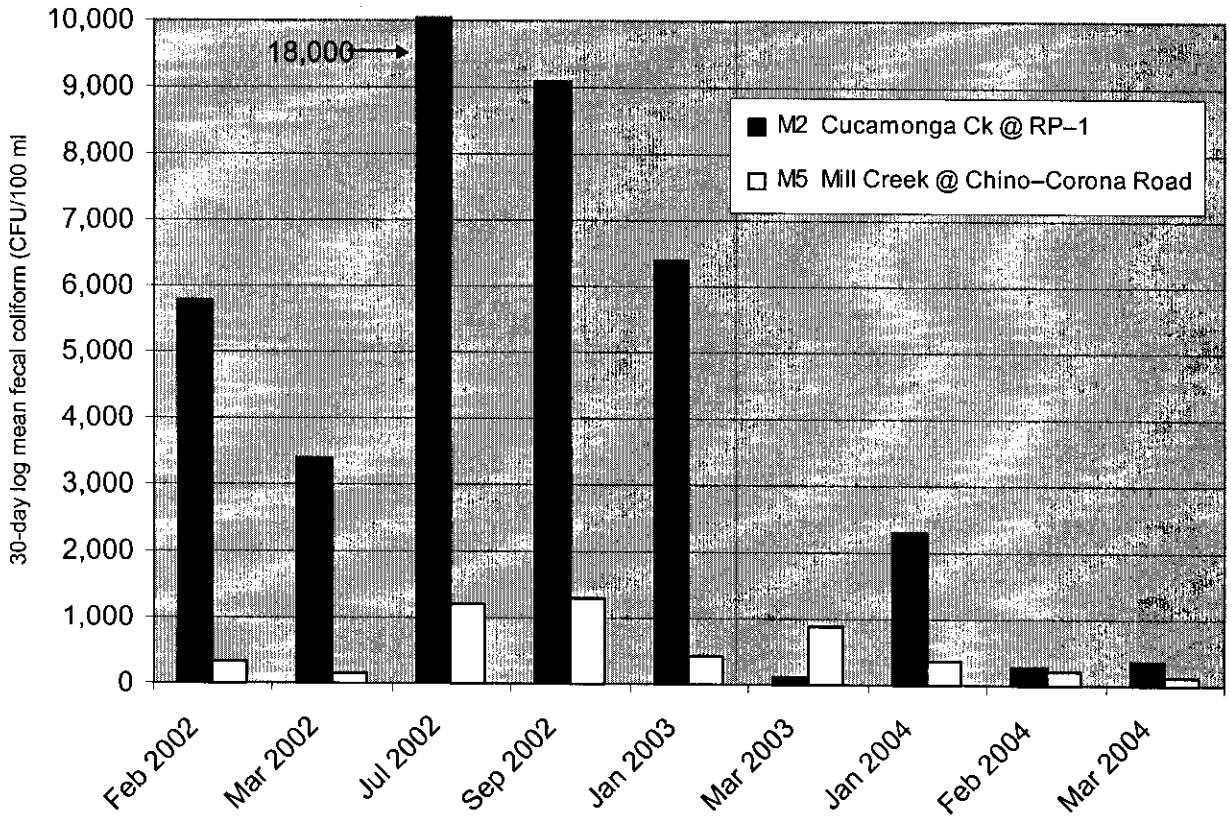
5.1.3 Mill Creek, Prado Area and Cucamonga Creek, Reach 1 (Valley Reach)

Comparison of data to Basin Plan REC-1 fecal coliform water quality objective (proposed numeric target) – Mill Creek (Prado Area) and Cucamonga Creek, Reach 1 are evaluated together since Cucamonga Creek is directly tributary to Mill Creek and in fact are essentially the same waterbody. To evaluate Cucamonga/Mill Creek, samples were collected at two sites during all nine 30-day sampling periods (2002–2004). Cucamonga Creek was sampled upstream of Inland Empire Utilities Agency's Regional Plant No. 1 (RP–1) discharge point (M2). Mill Creek was sampled at the Chino–Corona Road crossing (M5). Nine logarithmic means were generated for each site. Because of the low flow conditions in these creeks during the TMDL sampling period, Bon View Avenue (M3) @ Merrill Avenue only 13 samples were collected; at Archibald Avenue @ Cloverdale Avenue (M4) no samples were collected.

As shown in Tables 9, 10, and 11 at the RP–1 location, logarithmic means exceeded the water quality objective eight of the nine 30–day periods, and individual samples at RP–1 exceeded the single sample maximum 36 of 45 times (80%). At the Chino–Corona Road location, logarithmic means also exceeded the water quality objective eight of nine 30–day periods, and individual samples at the Chino–Corona Road location exceeded the single sample maximum 21 of 45 times (47%) (see Figure 25).

Comparison with the SWRCB's 303(d) Listing Policy Criteria – As shown in Tables 10 and 11, comparison of the results from Mill Creek and Cucamonga Creek to the 303(d) Listing Policy criteria confirms the impairment of these waterbodies. Both 30-day logarithmic means and the individual sample results for both sampling locations exceed the minimum number of exceedances for listing a waterbody on the 303(d) list.

Figure 25: 30-day Fecal Coliform Logarithmic Mean Densities for TMDL Monitoring of Cucamonga Creek/Mill Creek



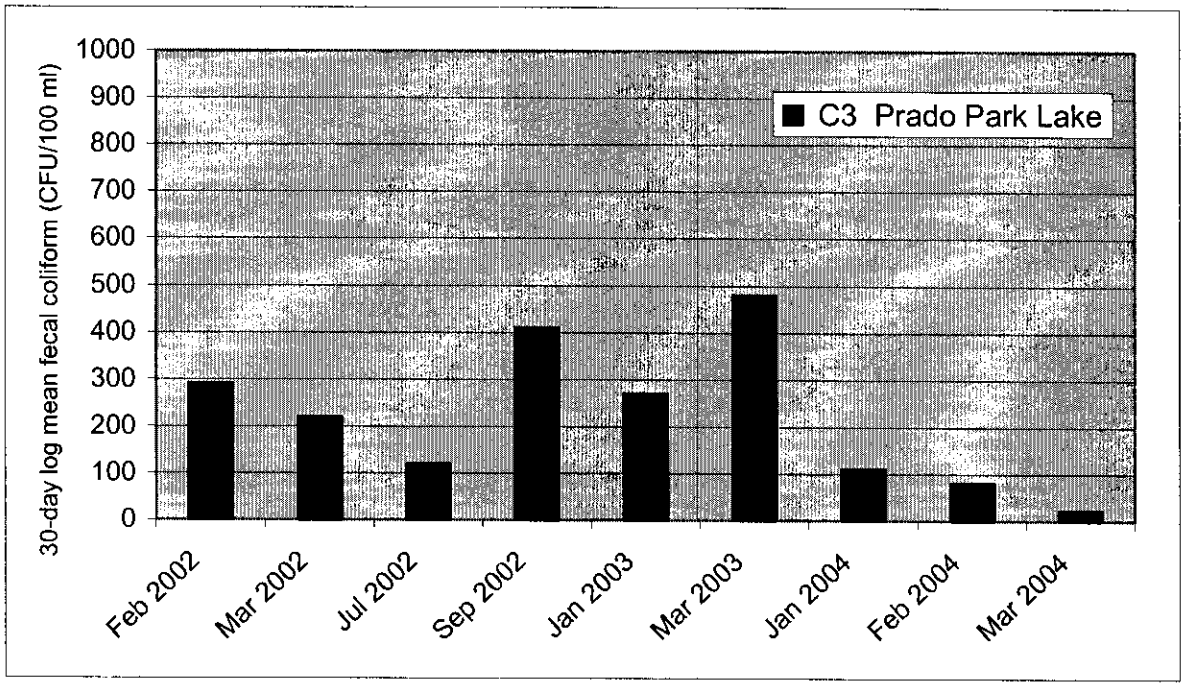
5.1.4 Prado Park Lake

Comparison of data to Basin Plan REC-1 fecal coliform water quality objective (proposed numeric target) – To evaluate water quality in Prado Park Lake, samples were collected at the lake's outlet structure (C3). Nine 30-day logarithmic means were generated for this location.

As shown in Figure 26, logarithmic means for Prado Park Lake exceeded the water quality objective five of nine 30–day periods, and individual samples at Prado Park Lake exceeded the single sample maximum 5 of 42 times (12%) (see Tables 9, 10, and 11).

Comparison with the SWRCB's 303(d) Listing Policy Criteria- As shown in Tables 10 and 11, comparison of the fecal coliform results for Prado Park Lake to the 303(d) Listing Policy criteria confirms the impairment of this waterbody. Both the 30-day logarithmic means and the individual sample results for both sampling locations exceed the minimum number of exceedances for listing a waterbody on the 303(d) list.

Figure 26: 30-day Fecal Coliform Logarithmic Mean Densities for TMDL Monitoring of Prado Park Lake



5.1.5 Icehouse Canyon Creek

Comparison of data to Basin Plan REC-1 fecal coliform water quality objective (proposed numeric target) – Icehouse Canyon Creek is located in the San Gabriel Mountains and is tributary to San Antonio Creek approximately 1.3 miles upstream of Mt. Baldy Village. The sampling site for Icehouse Canyon Creek (C1) is located approximately ½ mile upstream of the point where it discharges into San Antonio Creek. Nine logarithmic means were generated for Icehouse Canyon Creek.

As shown in Figure 27, only one of the nine logarithmic means exceeded the water quality objective. During the one 30–day period when the Basin Plan fecal coliform water quality objective was exceeded, only four samples were collected, three of which were at or below the water quality objective; however, the one remaining sample indicated bacteria levels 47 times greater than the water quality objective. This one sample significantly affected the logarithmic mean for that 30–day sampling period and is considered an aberration. Logarithmic means for the other eight 30–day periods were less than 20% of the water quality objective.

Comparison with the SWRCB's 303(d) Listing Policy Criteria - None of the 30-day logarithmic means or the individual sample results at Icehouse Canyon Creek exceeded the minimum number of exceedances for listing a waterbody on the 303(d) list (see Tables 10 and 11).

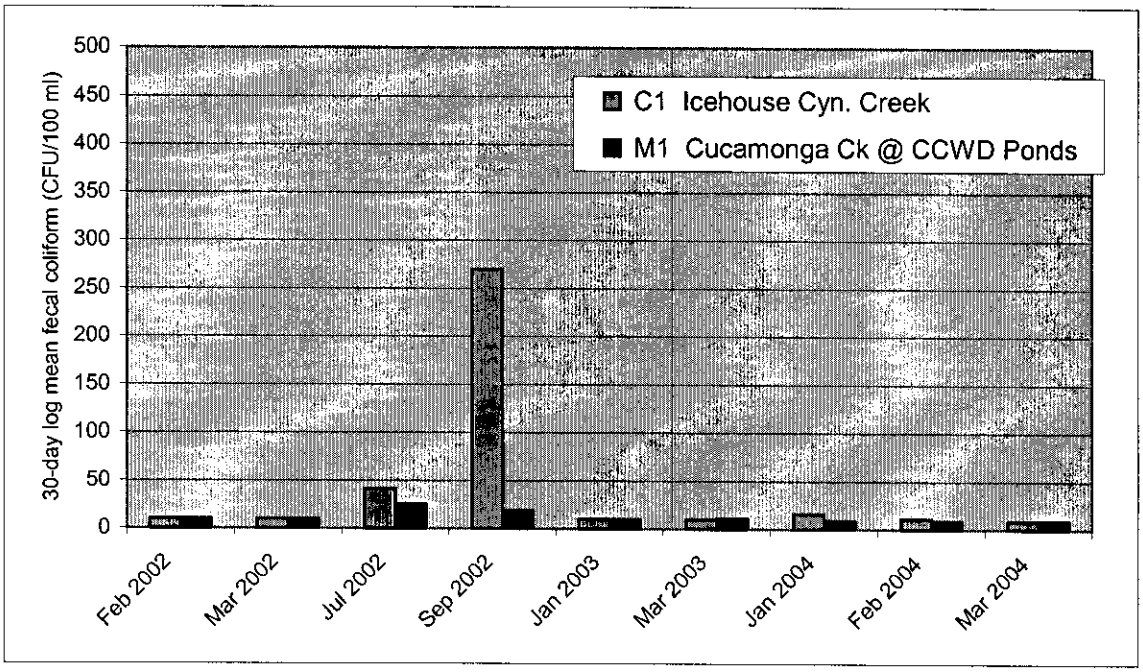
5.1.6 Cucamonga Creek, Mountain Reach at Cucamonga County Water District Ponds

Comparison of data to Basin Plan REC-1 fecal coliform water quality objective (proposed numeric target) – Cucamonga Creek, Mountain Reach begins in Cucamonga Canyon in the San Gabriel Mountains to the east of Icehouse Canyon. The sampling site for Cucamonga Creek, Mountain Reach (M1) is located immediately upstream of Cucamonga County Water District's recharge ponds, which are approximately 2.5 miles north of the 210 Freeway. Nine logarithmic means were generated for Cucamonga Creek, Mountain Reach.

As shown in Figure 27, of the nine 30-day logarithmic means, none exceeded the Basin Plan objective. In fact, all of the logarithmic means for Cucamonga Creek, Mountain Reach were less than 15% of the water quality objective, and none of the 44 individual samples at Cucamonga Creek, Mountain Reach exceeded the single sample maximum.

Comparison with the SWRCB's 303(d) Listing Policy Criteria - None of the nine 30-day logarithmic means or the individual sample results at Cucamonga Creek, Mountain Reach exceeded the minimum number of exceedances for listing a waterbody on the 303(d) list, pursuant to the Listing Policy (see Tables 10 and 11).

Figure 27: 30-day Fecal Coliform Logarithmic Mean Densities for TMDL Monitoring of Icehouse Canyon Creek and Cucamonga Creek, Mountain Reach



5.2 Source Contributions

As described previously, sources of bacteria and their relative contributions must be evaluated as part of the TMDL development process. To identify sources of bacteria, the TMDL Workgroup conducted the monitoring program described above. In addition to confirming exceedances of the REC-1 fecal coliform Basin Plan objective in the 303(d) listed waterbodies, sampling locations were also selected to identify and quantify contributions of fecal coliform from areas representing three general land uses – natural/open space, urban, and agricultural (including CAFOs and farming). Table 12 presents a summary of the monitoring results based upon the three land use types. These results are discussed further below.

5.2.1 Natural/Open Space Land Uses

As indicated above, water quality samples were collected from two monitoring locations representing natural/open space areas to evaluate pathogen contributions from natural or background sources. Open space land uses in the Middle Santa Ana River Watershed consist primarily of undeveloped National Forest land. One of the open space monitoring sites (designated C1) was located in Icehouse Canyon Creek. The other open space monitoring site (designated M1) was located in the mountain reach of Cucamonga Creek. Except for storm events, both of these sites primarily convey snowmelt, rising ground water, and spring water. During the 2002 through 2004 sampling period, a total of 43 samples were collected at Icehouse Canyon Creek and 44 samples were collected at Cucamonga Creek. A total of 9 logarithmic means were generated for each site.

As summarized in Table 12, at the Icehouse Canyon Creek site, only one 30-day logarithmic mean exceeded the fecal coliform water quality objective and only one of the 43 samples exceeded the single sample maximum Basin Plan objective. At the Cucamonga Creek site, none of the logarithmic means exceeded the water quality objective, and none of the 44 samples exceeded either the 30-day logarithmic mean or the single sample maximum objectives. These data indicate that runoff from the forest area/open space is not a source of fecal coliform, at least during the dry weather conditions when samples were collected. However, based on sampling data collected by Regional Board staff during storm events in natural areas in Moro Canyon and Crystal Cove State Park (Orange County Coastal Areas), during first flush storm conditions, fecal coliform densities are elevated ranging from 2300 MPN/100ml to 3000 MPN/100ml (Regional Board, 2004).

5.2.2 Urban Land Uses

Water quality samples were collected from two monitoring locations to evaluate pathogen contributions from urban land uses. Urban land uses in the Middle Santa Ana River Watershed include commercial enterprises, industrial facilities, low, medium and high–density residential, parks, golf courses, etc. One of the urban monitoring sites (designated C2) was located in Chino Creek at Schaeffer Avenue near the USGS gauging station. The other urban monitoring site (designated M2) was located in Cucamonga Creek upstream of IEUA's Regional Plant No. 1 discharge point. Both of these sites are located a short distance south of the 60 Freeway and, except for storm events, primarily convey nuisance runoff from urban areas. A total of 45 samples were collected at each location, which allowed calculation of a total of 9 logarithmic means at each location.

At the Chino Creek location, 7 of the 9 logarithmic means exceeded the 30-day logarithmic mean water quality objective, and 27 of the 45 samples (60%) exceeded the single sample water quality objective. At the Cucamonga Creek location, 8 of the 9 logarithmic means exceeded the 30-day logarithmic mean water quality objective, and 36 of the 45 samples (80%) exceeded the single sample water quality objective. As shown in Table 12, based upon these data, urban runoff is a major source of fecal coliform to the Middle Santa Ana River waterbodies.

Table 12 – 30-day Fecal Coliform Logarithmic Means for Sampling Results Sorted by Land Use (2002 – 2004) from Bacterial Indicator TMDL Monitoring Program

Site ID	Location	Feb 2002	Mar 2002	July 2002	Sep 2002	Jan 2003	Mar 2003	Jan 2004	Feb 2004	Mar 2004
Open Space										
C1	Icehouse Cyn Ck	10	10	41	**270**	10	10	16	11	9
M1	Cucam. Ck. @ CCWD Ponds	10	10	25	19	10	11	9	9	9
Urban										
C2	Chino Ck @ Schaeffer Ave.	**3,400**	**870**	**2,000**	**340**	**850**	**1,200**	**220**	180	83
M2	Cucam Ck @ RP–1	**5,800**	**3,400**	**18,000**	**9,100**	**6,400**	130	**2,300**	**270**	**360**
Agriculture										
M3	Bon View & Merrill	**7,400**	**29,000**	NS	NS	NS	NS	NS	NS	NS
M4	Archibald & Cloverdale	NS	NS	NS	NS	NS	NS	NS	NS	NS

Bold values denote fecal coliform logarithmic mean that exceed water quality objective of 200 CFU/100ml.

NS = No samples were collected at the sampling location during the sampling period or an insufficient number of samples were collected to generate a logarithmic mean.

5.2.3 Agricultural Land Uses

Two monitoring locations were identified to evaluate pathogen contributions from agricultural land uses. Agricultural land uses in the Middle Santa Ana River Watershed include dairy operations, vineyards, cropland, pastureland, and fallow areas. One of the agricultural monitoring sites (designated M3) was located at the intersection of Bon View Avenue and Merrill Avenue. The other agricultural monitoring site (designated M4) was located at the intersection of Archibald Avenue and Cloverdale Avenue. Both of these sites are located just downstream of areas that support only agricultural operations. Throughout the duration of the monitoring program, these channels were observed to convey water only in relation to storm events. A total of 13 samples were collected at the Bon View location, which allowed calculation of only 2 logarithmic means. However, no samples were collected at the Archibald location since during each sampling event, conditions at the site did not enable collection of water samples.

Both of the 30—day logarithmic means calculated for the Bon View location exceeded the water quality objective, and all 13 (100%) of the samples exceeded the single sample maximum objective. As mentioned above, the two monitoring stations representing the agricultural land use areas within the watershed had no flow during the majority of the TMDL sampling events (see Table 12). The Regional Board's dairy permit allows dairy operators to discharge wastewater only as a result of a 25-year, 24-hour storm event; they are not allowed to discharge at any other time. For the sampling conducted during 2002 – 2004, dairy operations in compliance with this requirement would not be a source of bacterial indicators in the Middle Santa Ana River watershed waterbodies since no storms of a magnitude that would allow the discharge of dairy wastes occurred. However, data collected at one of the agricultural monitoring points (Bon View and Merrill) indicates elevated fecal coliform densities during February and March of 2002. There was apparently some unidentified activity or a group of activities associated with dairy and/or agricultural operations that contributed to these elevated fecal coliform results. Further, based on the monitoring data collected during storm events in 1993 and 1996 – 1998, increased densities of fecal coliform are associated with dairy and agricultural operations during storm events. Based on the data collected, agricultural runoff contains elevated fecal coliform levels; however, additional data must be collected as part of the TMDL Phase II efforts to identify more fully the extent to which agricultural runoff consistently contributes to exceedances of the Basin Plan objectives

5.2.4 POTW Effluent Discharges

As discussed in Section 2.4, discharges from the various POTWs are required to meet stringent total coliform limits (instantaneous maximum of 240 MPN/100 ml and 7-day average of 2.2 MPN/100 ml and therefore would not be considered significant sources to the Middle Santa Ana River watershed waterbodies, unless there was a discharge violation. Staff evaluated the Facility Violation History for all of the POTWs for the 2002 – 2004 sampling period in order to determine if any of the POTWs had exceedances of the total coliform limits that could have influenced the sampling results in a downstream location.

The RIX facility and the City of Corona's facility are the only POTWs with recorded total coliform exceedances during any of the 2002 – 2004 sampling periods. During the 2002 – 2004 sampling period, each facility had one exceedance that could have influenced the sampling results. Based on the results from the TMDL sampling program, it is uncertain that these total coliform exceedances influenced the total coliform (or fecal coliform) densities measured in the Santa Ana River.

The closest TMDL sampling location to the City of Corona's treatment plant is the Santa Ana River at Prado Dam. The effects of total coliform violation recorded at the Corona facility on September 2, 2002 would be expected to be seen at the Prado Dam sampling location that same day or shortly thereafter – this depends on if the Army Corps of Engineers was allowing water to flow through Prado Dam or retaining any water behind the dam since the sampling location is downstream of the dam. September 15, 2002 was the closest date to the September 2, 2002 Corona violation that TMDL sampling occurred. As shown below in Table 13, the recorded total coliform violation (500

MPN/100 ml) from the Corona facility on September 2, 2002 was well below the September 15, 2002 measured total coliform density at Prado Dam of 1,500 CFU/100 ml. Thus, it is unclear if this POTW violation impacted the Santa Ana River.

The RIX facility affects the Santa Ana River; the River sampling location at MWD Crossing would be impacted by any violation from the facility. As can be seen in Table 13, the RIX violation on January 22, 2003, could have resulted in the elevated total coliform densities measured at MWD Crossing on the same day as the recorded RIX violation. It should be noted, however that total coliform densities measured at MWD Crossing during January 2003 ranged from 2,500 CFU/100 ml (1/15/03) to 4,800 CFU/100 ml (1/08/03). Further, densities of 4,400 were measured at MWD Crossing on January 29, 2003 – well past the approximately half a day RIX travel time for the effluent to reach MWD Crossing. Therefore, it does not appear that the RIX violation affected the total coliform density measured at MWD Crossing, and further it appears as if background levels of total coliform bacteria at MWD Crossing range from 2,000 CFU/100 ml to 5,000 CFU/100 ml (see Appendix A for tabulation of data).

Table 13 – POTW Recorded Total Coliform Exceedances During the 2002 – 2004 TMDL Monitoring Period

City of Corona	
Date of violation:	9/02/02
Violation	Instantaneous maximum limit of 240 MPN/100 ml.
Total coliform density	500 MPN/100 ml
Sampling Location Potentially Impacted	Santa Ana River at Prado Dam
Sample Date Potentially Impacted	9/15/02
Sampling results at Prado Dam	total coliform – 1500 CFU/100 ml) fecal coliform – 320 CFU/100 ml)
RIX	
Date of violation:	1/22/03
Violation	Instantaneous maximum limit of 240 MPN/100 ml.
Total coliform density	1600 MPN/100ml
Sampling Location Potentially Impacted	Santa Ana River at MWD Crossing
Sample Date Potentially Impacted	1/22/03
Sampling results at MWD Crossing	total coliform – 2800 CFU/100 ml) fecal coliform – 160 CFU/100 ml)

5.3 Re–growth of Bacterial Indicators in Streams

As living organisms, bacteria and other micro–organisms complete life cycles. These life cycles include reproduction and death, and usually occur within the digestive tracts of humans and other animals. In the past, it was assumed that once bacterial indicators and pathogens were removed from their native environment (i.e., digestive tracts of animals), they would fairly quickly die–off in the adverse conditions of the open environment. However, there are some indications that bacterial indicators and some pathogens can and do survive in the open environment. Studies of freshwater and marine waterbodies suggest that indicator bacteria can survive for extended periods of time in sediments and that they can reproduce in these environments (Desmarais, et al, 2002; Davies, et al, 1995). The conditions under which these phenomena occur and how different pathogenic organisms react and function in these environments have not been fully examined; however, considering the results of studies completed to date, a portion of pathogen impairment could be attributable to survival and reproduction of organisms within impaired streams and rivers. Whether, and to what extent, bacteria re-growth may be occurring in the middle Santa Ana River watershed waterbodies needs to evaluated as part of ongoing TMDL implementation efforts.

5.4 Seasonal Variations

Based upon limited historic data generated from monitoring the Middle Santa Ana River Watershed waterbodies (see the discussion of the 1993 and 1996 – 1998 data in Section 3), elevated densities of fecal coliform are associated with storm events. However, as noted previously, no dry season (baseflow) fecal coliform data were collected during the 1993 or 1996 – 1998 sampling periods to allow comparison to the storm event data. Thus, these storm event data do not make a compelling argument for the existence of seasonal or annual variation in fecal coliform results.

A comparable problem pertains to the 2002-2004 data collected in support of development of this TMDL. As discussed previously, this monitoring occurred during the prevailing dry weather conditions and did not include storm event data. The data collected at each sampling location showed variation in the fecal coliform densities measured during different sampling events. Likewise, the 30-day logarithmic means also varied among the 30-day sampling periods. However, no seasonal and/or annual variation in fecal coliform densities is apparent.

Collectively, the available data indicate that elevated fecal coliform densities can result from both storm and dry-weather runoff; no seasonal or annual variation can be discerned from these data.

5.5 Conclusions

Based upon the data and information collected in 1993, 1996 – 1998 and in 2002 – 2004, the following conclusions with regard to sources of fecal coliform bacteria can be made:

1. Urban runoff is a significant source of bacterial indicators year–round.
2. Available historic data (1993 and 1996 – 1998) indicate that storm water runoff from areas associated with, and adjacent to, agricultural operations contains high densities of fecal coliform. More recent data (2002 – 2004) also indicates some contribution of fecal coliform from agricultural operations during non-rainy periods
3. Open space and wilderness areas are not significant sources of fecal coliform under the dry weather conditions investigated.
4. POTW discharges to the Santa Ana River and tributaries are not sources of fecal coliform.
5. Additional data need to be collected to identify specific sources of fecal coliform under both dry and wet weather conditions.
6. It is unknown if there is survival and reproduction of bacterial indicators in the sediments of the impaired waterbodies. This needs to be investigated further for waterbodies in the Middle Santa Ana River watershed.
7. Additional year–round water quality monitoring is needed to evaluate seasonal variations in bacterial indicator densities.

SECTION 6 – TOTAL MAXIMUM DAILY LOADS, WASTE LOAD ALLOCATIONS, LOAD ALLOCATIONS

A prioritized, phased approach to the control of bacterial quality in Middle Santa Ana River waterbodies is proposed in this TMDL. This approach is appropriate, given the complexity of the problem, the paucity of relevant data on seasonal variations and bacterial sources and fate, and the expected difficulties in identifying and implementing appropriate control measures. The phased approach is intended to allow for additional monitoring and assessment to address areas of uncertainty and for future revision and refinement of the TMDL as warranted by these studies.

Unlike most TMDLs, which establish a limitation on the mass per day of a pollutant that can be discharged while still complying with water quality objectives, the proposed TMDL is expressed in terms of density because of the difficulty in, and limited usefulness of quantifying the mass of coliform organisms. It is the number of organisms in a given volume of water (i.e., their density), and not their mass, that is significant with respect to public health and the protection of beneficial uses. The density of coliform organisms in a discharge and in the receiving waters is the technically relevant criterion for judging the impact of the discharges and the suitability of the affected receiving waters. Federal guidance on the development of TMDLs suggests establishing a TMDL in this manner for a pollutant that is not readily controlled on a mass basis.

Similarly, unlike the mass–based wasteload allocations (WLAs) and load allocations (LAs) established to meet most TMDLs, density–based WLAs and LAs are proposed in this report. Unlike the mass-based approach, density–based WLAs and LAs do not add up to equal the TMDL. The densities of individual bacterial sources are not additive. To achieve a density–based TMDL, it is simply necessary to assure that each WLA and LA itself meets the density–based TMDL. That is the approach taken here. An implicit margin of safety accounts for any uncertainty in the relationship between the maximum allowable bacteria loads and resulting water quality impacts (see more discussion of the Margin of Safety in Section 7.1).

Table 14 shows the proposed TMDL, WLAs for point sources of fecal coliform inputs, and LAs for nonpoint source inputs. As shown, the TMDL, WLAs, and LAs are established to assure compliance with the existing water contact recreation (REC-1) standards no later than December 31,2020

Point sources discharges of bacterial indicators include urban storm and non-stormwater runoff, for which the Counties of San Bernardino and Riverside and their respective co-permitees in this watershed are responsible. Discharges from confined animal feeding operations (CAFOs) are also sources. (See Table 8 for applicable permits).

Nonpoint source discharges of bacterial indicators considered include those from agricultural runoff (apart from CAFOs) and open space/forest runoff. Currently, none of these discharges are regulated by waste discharge requirements (see Table 8).

Table 14 – Proposed Total Maximum Daily Load, Waste Load Allocations, and Load Allocations for Fecal Coliform in Middle Santa Ana River Waterbodies

Total Maximum Daily Load for Fecal Coliform in Middle Santa Ana River Waterbodies	Waste Load Allocation for Fecal Coliform in Urban Runoff, including stormwater, Discharges to Middle Santa Ana River Waterbodies	Waste Load Allocation for Fecal Coliform in Confined Animal Feeding Operations Discharges to Middle Santa Ana River Waterbodies	Load Allocation for Fecal Coliform in Agricultural Runoff Discharges to Middle Santa Ana River Waterbodies	Load Allocations for Fecal Coliform from Natural Sources in all Discharges to Middle Santa Ana River Waterbodies
5–sample/30–days Logarithmic Mean less than 200 organisms/100ml, and not more than 10% of the samples exceed 400 organisms/10ml for any 30–day period.	5–sample/30–days Logarithmic Mean less than 200 organisms/100ml, and not more than 10% of the samples exceed 400 organisms/10ml for any 30–day period.	5–sample/30–days Logarithmic Mean less than 200 organisms/100ml, and not more than 10% of the samples exceed 400 organisms/10ml for any 30–day period.	5–sample/30–days Logarithmic Mean less than 200 organisms/100ml, and not more than 10% of the samples exceed 400 organisms/10ml for any 30–day period.	5–sample/30–days Logarithmic Mean less than 200 organisms/100ml, and not more than 10% of the samples exceed 400 organisms/10ml for any 30–day period.

[a] To be achieved as soon as possible, but no later than December 31, 2020

SECTION 7 – MARGIN OF SAFETY, SEASONAL VARIATIONS, AND CRITICAL CONDITIONS

7.1 Margin of Safety

A margin of safety is a component required by the Clean Water Act in developing total maximum daily loads (TMDLs). This margin of safety is achieved by allocating a percentage of the TMDL for safety or by utilizing protective assumptions that account for uncertainty about pollutant loading and waterbody response. For pathogens, a margin of safety could be achieved by adopting a lower numeric target. However, a lower numeric target would be inappropriate since it would, in effect, result in goals that are more stringent than those currently established in the Basin Plan. Protective assumptions are more appropriately applied to pathogens in development of these TMDLs. For the pathogen TMDLs in the Middle Santa Ana River Watershed, a substantial and adequate margin of safety is implicitly incorporated by the fact that the TMDL and allocations do not account for dilution and organism die–off. In addition, a margin of safety is assumed by applying the existing water quality objectives as the TMDL because conservative methods were used in developing the baseline water quality criteria upon which the water quality objectives are based[7]. Consequently, an explicit margin of safety is considered to be unnecessary and staff proposes to specify an implicit margin of safety.

7.2 Seasonal Variations

As discussed in Section 5.3, the data now available to do not provide compelling evidence of seasonal variations in fecal coliform densities. Accordingly, no seasonal differences in the TMDL or WLAs/LAs are proposed.

7.3 Critical Conditions

TMDL regulations at 40 CFR 130.7(c)(1), state that TMDLs shall take into account critical conditions for stream flow, loading, and water quality parameters. As discussed in Section 2.5, the Basin Plan REC-1 objectives apply year-round; no distinctions based on climate or other conditions that may affect actual REC-1 use are specified. To assure that the REC-1 objectives are consistently achieved, the proposed TMDL requires compliance with the WLAs and LAs year-round.

The Stormwater Quality Standards Task Force (see Section 2.6) is examining whether refinement of the REC-1 beneficial use designation is appropriate for certain waters in which actual REC-1 use may be limited temporally and/or spatially as the result of critical flow conditions or other waterbody characteristics. To the extent that this work results in amendment of the REC-1 beneficial use designations for one or more of the Middle Santa Ana River waterbodies and the applicable bacterial objectives, this TMDL will need to be revisited and revised accordingly. Changes to the REC-1 beneficial use

[7] While the USEPA has established national bacteria quality criteria based on indicators considered more reliable than fecal coliform bacteria in judging the risk of waterborne infectious disease, it is nevertheless true that the fecal coliform criteria were derived using conservative assumptions.

designations and relevant objectives are likely to be based, at least in part, on critical flow conditions.

SECTION 8 – IMPLEMENTATION RECOMMENDATIONS

Federal regulations require the State to identify measures needed to implement TMDLs in the state water quality management plan. The Water Code also includes requirements for the development of implementation plans. Implementation of the proposed TMDL is expected to result in compliance with the water quality objectives for fecal coliform and ensure protection of the beneficial uses of Middle Santa Ana River Watershed waterbodies. The proposed implementation plan shown in Attachment A requires the Regional Board and responsible parties in the Middle Santa Ana River Watershed to complete the implementation measures described below.

8.1 Actions by the Regional Board

To implement the TMDL, WLAs, and LAs, Board staff proposes that the Regional Board undertake the following actions. Proposed dates for implementation of these actions are specified in the proposed Basin Plan amendment (Attachment A).

8.1.1 Revise Existing Water Discharge Requirements

The Regional Board shall review and revise, as necessary, the following existing NPDES permits to incorporate the appropriate WLAs, compliance schedules and monitoring program requirements.

A. Waste Discharge Requirements for the San Bernardino County Flood Control District, the County of San Bernardino and the Incorporated Cities of San Bernardino County within the Santa Ana Region, Areawide Urban Runoff, NPDES No. CAS 618036 (Regional Board Order No. R8-2002-0012).

B. Waste Discharge Requirements for the Riverside County Flood Control and Water Conservation District, the County of Riverside and the Incorporated Cities of Riverside County within the Santa Ana Region, Areawide Urban Runoff, NPDES No. CAS 618033 (Regional Board Order No. R8-2002-0011).

C. General Waste Discharge Requirements for Concentrated Animal Feeding Operations (Dairies and Related Facilities) within the Santa Ana Region, NPDES No. CAG018001 (Regional Board Order No. 99-11) (Dairy Permit).

8.1.2 Identify Agricultural Owners/Operators

The Regional Board shall identify all agricultural owners/operators in the Middle Santa Ana River watershed and notify these parties of their responsibilities pursuant to the TMDL.

8.2 Actions by Stakeholders

To ensure that effective pathogen control programs that achieve the appropriate final WLAs and LAs are developed and implemented, staff proposes that the following requirements for the appropriate responsible parties be incorporated into the

Implementation Plan. Proposed dates for implementation of these actions are specified in the proposed Basin Plan amendment (Attachment A).

8.2.1 Urban Stormwater Management

The Regional Board, through NPDES permits, requires San Bernardino and Riverside Counties, along with their respective co-permitees, to develop and implement Drainage Area Management Plans (DAMPs) or Water Quality Management Plans (WQMPs) to protect water quality effects attributable to urban runoff. The counties and municipalities will need to update their programs and plans to address fecal coliform discharges to the extent that they are not currently being addressed. Revision to, and implementation of, the Riverside County and the San Bernardino County DAMPs and WQMPs will describe the measures to be undertaken to comply with this TMDL. Provisions specified in the Areawide stormwater permits (provisions of the DAMP and the WQMP) are expected to suffice to address TMDL requirements.

As discussed in Section 5, very little monitoring has been conducted to evaluate specific sources of pathogens in urban runoff. Monitoring performed as part of Middle Santa Ana River Watershed TMDL development only identified urban runoff as a general source. Consequently, additional studies are needed to identify specific activities, operations, and processes in urban areas that contribute pathogens to Middle Santa Ana River Watershed waterbodies. This information will enable the Regional Board and stakeholders to develop improved pathogen management practices. Additional monitoring needs are addressed in Section 9, below.

8.2.2 Agricultural Runoff Management

Regional Board staff recommends that agricultural owners/operators (including CAFO owners/operators) in the watershed be required to develop and implement a program to address bacterial discharges. CAFO owners would be required to implement this requirement through the Regional Board's Dairy Permit.

As with urban runoff, there is also limited data on specific sources of pathogens in agricultural runoff. Additional studies need to be conducted to identify specific activities, operations, and processes in agricultural areas that contribute pathogens to Middle Santa Ana River Watershed waterbodies. Again, monitoring needs are addressed in Section 9.

8.2.3 Open Space/Forest Lands Management

Open space/forest lands were not found to be major dry weather contributors of bacteria to the Middle Santa Ana River waterbodies. Data need to be collected to assess storm event contributions. Monitoring needs are identified in Section 9.

SECTION 9 – MONITORING RECOMMENDATIONS

Section 13242 of the California Water Code specifies that Basin Plan implementation plans must contain a description of the monitoring and surveillance programs to be undertaken to determine compliance with water quality objectives. As part of the incorporation of the proposed Middle Santa Ana River Watershed Fecal Coliform TMDLs into the Basin Plan, monitoring requirements are proposed (Attachment A) in order to evaluate the effectiveness of actions and programs implemented pursuant to the TMDLs. Since the Middle Santa Ana River Watershed Pathogen TMDLs are phased TMDLs, follow–up monitoring and evaluation is essential to validate and revise the TMDL as necessary.

As discussed in Section 5, Regional Board staff, in coordination with watershed stakeholders, implemented an extensive TMDL bacterial indicator monitoring program. This monitoring program should be continued through the TMDL implementation phase in order to evaluate water quality conditions in the impaired waterbodies, to evaluate the effectiveness of implementation measures, and to ensure compliance with the Regional Board's Basin Plan. Therefore, staff proposes that stakeholders continue to implement a monitoring program for bacterial indicators that includes collecting at least 5 samples per 30 day period during both wet and dry seasons from selected monitoring stations in the Middle Santa Ana River Watershed (see Attachment A)

SECTION 10 – CEQA ANALYSIS

The Secretary of Resources has certified the Basin Planning process as functionally equivalent to the preparation of an Environmental Impact Report (EIR) or a Negative Declaration pursuant to the California Environmental Quality Act (CEQA). However, in lieu of these documents, the Regional Board is required to prepare the following: the Basin Plan amendment; an Environmental Checklist that identifies potentially significant adverse environmental impacts of the Basin Plan amendment; and, a staff report that describes the proposed amendment, reasonable alternatives, and mitigation measures to minimize any significant adverse environmental impacts identified in the Checklist. The Basin Plan amendment, Environmental Checklist, and staff report together are functionally equivalent to an EIR or Negative Declaration.

The draft Environmental Checklist (Attachment B) concludes that there would be no potentially significant adverse impacts on the environment caused by adoption of this Basin Plan amendment. Therefore, no mitigation measures are required.

This staff report will be followed by another report that includes comments received on the proposed amendment, staff responses to those comments, and a discussion of any changes made to the proposed amendment as the result of the comments or further deliberation by the Board, and/or Board staff. This follow–up report would address any additional CEQA considerations, including economics, which might arise as the result of any changes to the proposed amendment.

Consideration of Alternatives

1. **No Project Alternative**

   The "No Project" alternative would be no action by the Regional Board to adopt a TMDL with implementation measures and a monitoring program. This alternative would not meet the purpose of the proposed action, which is to correct ongoing violations of Basin Plan objectives for fecal coliform and adverse effects on REC-1 beneficial uses. This alternative would result in continuing water quality standards violations and threat to public health and safety. This alternative would not comply with the requirements of the Clean Water Act.

2. **Alternatives**

   The Regional Board could consider a TMDL based on alternative numeric targets, or other bacterial indicators. However, the proposed numeric targets are based on existing numeric water quality objectives already incorporated in the Regional Board's Basin Plan. The proposed targets provide the best assurance that the water quality objectives for pathogens will be achieved and that the beneficial uses will be protected. The proposed numeric targets are therefore consistent with the purpose of the TMDL.

   The Board could also consider an alternative TMDL implementation strategy that is based on a different compliance schedule approach. Adoption of a longer schedule would prolong non–attainment of the water quality standards. The proposed compliance schedule considers the quality of available data for different hydrologic conditions and the need for additional studies to fill data gaps and address uncertainties in the TMDL. In addition, the proposed compliance schedule allows time for implementation of projects

and best management practices that are expected to result in improvement of Middle Santa Ana River Watershed waterbodies. The proposed compliance schedules therefore, considered reasonable.

3 Proposed Alternative

Staff believes that the recommended TMDL reflects a reasoned and reasonable approach to achieving water quality standards in the Middle Santa Ana River Watershed waterbodies. The proposed implementation schedule also provides a realistic time frame in which to complete the tasks required by the TMDL.

SECTION 11 – ECONOMIC CONSIDERATIONS

As previously indicated, the Regional Board is required to include TMDLs in the Basin Plan. There are three statutory triggers for consideration of economics in basin planning. These triggers are:

1. Adoption of an agricultural water quality control program (Water Code Section 13141). The Regional Board must estimate costs and identify potential financing sources in the Basin Plan before implementing any agricultural water quality control plan.

2. Adoption of a treatment requirement or performance standard. The Regional Board must comply with the California Environmental Quality Act (CEQA) when amending the Basin Plan. CEQA requires that the Board consider the environmental effects of reasonably foreseeable methods of compliance with Basin Plan amendments that establish performance standards or treatment requirements, such as TMDLs. The costs of the methods of compliance must be considered in this analysis.

3. Adoption of water quality objectives (Water Code Section 13241). The Regional Board is required to consider a number of factors, including economics, when establishing or revising water quality objectives in the Basin Plan.

It should be noted that in each of these cases, there is no statutory requirement for a formal cost-benefit analysis.

As discussed above, adoption of this proposed TMDL does not constitute the adoption of new or revised water quality objectives, so the third statutory trigger does not apply here (the proposed TMDL/Basin Plan amendment ensures compliance with the existing Basin Plan objective). However, implementation of this TMDL is likely to result in changes in agricultural operations to control bacteria runoff quality. Similarly, implementation of this TMDL will likely necessitate changes in programs (including educational programs and BMPs) designed to reduce bacterial inputs from urban stormwater or other sources. It is necessary, therefore, to consider the costs and potential funding mechanisms for the implementation of new/modified agricultural water quality control programs, and the costs of other measures that may be necessary to achieve (and monitor) compliance with the TMDL.

11.1 Estimated Cost of Agricultural Water Quality Control Programs and Potential Funding Sources

As indicated previously, Section 13141 of the Water Code requires the Regional Board to estimate the cost of any agricultural water quality control program prior to requiring its implementation, and to identify funding sources. Implementation of agricultural water quality control programs is likely to include both development of agricultural BMPs, and development and implementation of special studies to identify specific sources of bacteria (see Section 8.2.2). Agricultural BMPs implemented could be the same as those implemented to address urban runoff. The potential costs of these measures are discussed below.

Identification of sources of bacterial contamination in agricultural runoff may involve investigations comprised of field surveys and evaluation of nuisance runoff associated with the agricultural areas within the Middle Santa Ana River Watershed. These activities would involve collecting and analyzing water quality samples, and determining and evaluating activities that are generating and discharging bacterial indicators. This might also involve some mapping tasks, and acquiring and evaluating land use data. Based on comparable projects proposed for Proposition 13 funding, staff estimate that the cost to perform such an investigation would range between $450,000 and $650,000.

Potential funding sources could include the following:

1. Private financing by individual sources;
2. Bonded indebtedness or loans from governmental institutions;
3. State or federal grants or low-interest loan programs; and
4. Single-purpose appropriations from federal or state legislative bodies (including land retirement programs).

11.2 Estimated Costs for Implementation of Control Measures

Best management practices are a primary tool to improve the quality of surface waterbodies. They include structural and non–structural options. Based upon the results of activities that would be required pursuant to the TMDL implementation task described in Section 8.2 – urban, open space and agriculture source evaluations, a series of BMPs would be identified and evaluated to address pathogen–generating activities. These BMPs would reduce discharge of pathogens to Middle Santa Ana River Watershed waterbodies. Based upon similar control measure projects proposed for areas within the Region, staff estimates that the cost to perform such an evaluation would range between $200,000 and $600,000.

There are a variety of BMPs that could be implemented to address fecal coliform discharges. These BMPs include subsurface wetlands, runoff diversion and treatment, street sweeping, and public education. Discussions of these BMPs and potential costs follow:

Subsurface wetlands – Subsurface wetlands have been known to reduce levels of nutrients, pathogens, and suspended solids. Subsurface wetlands are basin type structures that could be constructed adjacent to, or even within, streams, channels, or flood control structures. Wetland plants are placed in gravel layers within the wetland basins. Water from the subject waterbody is directed through the gravel layers. Constituents of concern are taken up through plant roots or used as a food source for beneficial microbes, which coat the gravel particle surfaces. The water level within the basin never rises above the top surface of the gravel layers. These facilities can provide some habitat for smaller animals and birds. Based upon a similar project implemented at a CAFO facility within the Chino Basin area, staff estimates that the approximate cost of these types of facilities can range from $50,000 to $200,000.

Runoff Diversion and Treatment – In some areas of southern California, including the Santa Ana Region, nuisance runoff is diverted from a stream or channel and conveyed to a sanitary sewer. The water is then subject to typical wastewater treatment processes for reduction of constituents of concern. Approximate costs of construction and setup for some of these projects ranged from $60,000 to $1,405,000. Approximate regular monthly costs to divert low-flow range from $1,100 to $4,500. (Orange County, et al, 2003)

Street Sweeping – Street sweeping involves utilizing sweepers to clean the streets on a regular basis. Costs could include the purchase of equipment, operation and maintenance of the sweepers, and costs for disposal of waste materials. Costs per curb mile vary depending upon the sweeping frequency and the sweeper type. Estimates of cost to implement a sweeper program with a vacuum assisted sweeper range from $18/curb–mile/year for once a year sweeping to $946/curb–mile/year for weekly sweeping. Estimates of costs to implement a sweeper program with a mechanical sweeper range from $32/curb–mile/year for once a year sweeping to $1,680/curb–mile/year for weekly sweeping. Staff estimates that there are approximately 7,000 to 8,000 curb–miles within the Chino Basin Watershed (areas north of Santa Ana River Reach 3). (USEPA 1999)

Public Education – Public education programs encompass other more specific programs, such as fertilizer and pesticide management, public involvement in stream restoration and monitoring, storm drain stenciling, and overall awareness of aquatic resources. All public education programs seek to reduce pollutant loads by changing people's behavior. Components of a public education program could include supplies, communications, student transportation, teacher training, equipment, staffing, and various fees. Approximate costs for a public education program range from $50,000 to $300,000 per year. Approximate costs for adding a Youth Conservation Corps program that supports clean–up activities in creeks range between $200,000 and $250,000. (USEPA 1999)

11.3 Estimated Costs of Implementation of Monitoring Program

As discussed in Section 9, staff recommends that a monitoring program for bacterial indicators that includes collecting at least 5 samples per 30-day period from selected monitoring stations in the Middle Santa Ana River Watershed be implemented. Regional Board staff have identified 10 locations, at a minimum that should be monitored weekly and during storm events for bacterial indicators. In addition, Regional Board staff have identified 4 other locations that should be monitored for bacterial indicators during storm events and during the days immediately following storm events to evaluate potential pathogen contributions. Based on the costs for implementation of the monitoring program utilized for development of the TMDL (see Section 5), staff estimates that approximate costs to implement the monitoring program would range between $175,000 and $240,000 per year.

As an example of a source analysis investigation, the TMDL Workgroup concluded that more detailed water quality information is needed to more specifically determine

pathogen sources. Consequently, the TMDL Workgroup and Regional Board staff coordinated efforts with SAWPA and USGS to develop a proposal for funding through the State's Proposition 13 grant program. The funds were awarded to SAWPA to work with USGS, who also contributed match funding, to develop and implement the Chino Basin Pathogen TMDL Phase II Monitoring and Modeling Program. The program was initiated in January 2004 and is scheduled to finish in March 2006. The focus of the program is to collect bacterial water quality samples at locations representing specific land use types including residential, commercial, industrial, dairy, irrigated agriculture, and mixed. The data generated from this sampling effort, as well data from the Phase I monitoring program (see Section 5), will be compiled and used in a model developed by USGS staff. Results of these monitoring and modeling efforts will be used to identify which land uses activities generate excessive levels of bacteria in order to coordinate and target TMDL implementation activities in the future.

11.4 Estimated Costs of Implementation of Urban, and Agricultural Source Identification Programs

This implementation measure is essentially an investigation comprised of field surveys and evaluation of nuisance runoff associated with the urban, and agricultural areas within the Middle Santa Ana River Watershed. These activities would involve collecting and analyzing water quality samples, and determining and evaluating activities that are generating and discharging bacterial indicators. This might also involve some mapping tasks, and acquiring and evaluating land use data. Based upon comparable projects proposed for Proposition 13 grant funding, staff estimates that the cost to perform these investigations would range between $450,000 and $650,000.

SECTION 12 – PUBLIC PARTICIPATION

Federal regulations at 40 CFR 130.7 require that TMDLs be subject to public review. The Regional Board, in its consideration and adoption of this proposed TMDL, is following the Basin Planning public review process. A public workshop and CEQA scoping meeting will be held during the Board workshop scheduled for February 3, 2005. Specific public notice requirements pertaining to this Basin Plan amendment will also be fulfilled.

In addition to the legal requirements for public participation, in August 2001, Regional Board staff convened a TMDL Workgroup. The Workgroup has had an integral role in assisting Regional Board staff is the development of the proposed TMDL, including reviewing existing bacterial data for the 303(d) listed waterbodies, designing and implementing the source identification monitoring program discussed in Section 5, reviewing results from the monitoring program, and reviewing grant study proposals from Regional Board staff and/or other watershed stakeholders. Workgroup meetings were facilitated by the Santa Ana Watershed Project Authority (SAWPA) staff, which also compiled Workgroup meeting notes. SAWPA staff's assistance was supported through TMDL funding provided by the State.

Regular Workgroup participants include representatives from the following agencies or organizations:

- San Bernardino Count Flood Control District
- Riverside County Flood Control District
- Santa Ana Watershed Project Authority
- California Department of Water Resources
- San Bernardino Municipal Water District
- Inland Empire Utilities Agency
- Orange County Water District
- Chino Basin Watermaster
- Milk Producers Council
- Western United Dairymen
- City of Riverside
- City of Corona

SECTION 13 – STAFF RECOMMENDATION

Direct staff to prepare a Basin Plan amendment and related documentation to incorporate the bacterial indicator TMDL for Middle Santa Ana River Watershed waterbodies that is shown in Attachment A for consideration at a future public hearing.

SECTION 14 -- REFERENCES

1. American Public Health Association (APHA), American Water Works Association (AWWA), Water Environment Federation (WEF). Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998, pages 9–70 to 9–71.

2. US Environmental Protection Agency (USEPA). Ambient Water Quality Criteria for Bacteria, 1986.

3. Haile, Robert W., Witte, John S., Gold, Mark, Cressey, Ron, McGee, Charles, Millikan, Robert C., Glasser, Alice, Harawa, Nina, Ervin, Carolyn, Harmon, Patricia, Harper, Janice, Dermand, John, Alamillo, James, Barrett, Kevin, Nides, Mitchell, Wang, Guang–yu. "The Health Effects of Swimming in Ocean Water Contaminated by Storm Drain Runoff," Epidemiology Resources, Inc., Volume 10, Number 4, July 1999, pages 355 – 363.

4. Natural Resources Defense Council (NRDC). Swimming in Sewage, February 2004, pages 8–9

5. Santa Ana Regional Water Quality Control Board (Regional Board). 1995. Water Quality Control Plan – Santa Ana River Basin – Region 8, Chapter 3 – Beneficial Uses, Chapter 4 – Water Quality Objectives.

6. USEPA. Preliminary Data Summary of Urban Storm Water Best Management Practices, 1999, pages 6–1 to 6–44.

7. Orange County California, Cities of Orange County California, and Orange County Flood Control District. Drainage Area Management Plan (DAMP), July 2003, Appendix E6, pages E6–18 to E6–63.

8. Desmarais, Timothy R., Solo–Gabriele, Helena M., and Palmer, Carol J. "Influence of Soil on Fecal Indicator Organisms in a Tidally Influenced Subtropical Environment," Applied and Environmental Microbiology, Volume 68, Number 3, March 2002, pages 1165 – 1172.

9. Davies, Cheryl M., Long, Julian A. H., Donald, Margaret, and Ashbolt, Nicholas J. "Survival of Fecal Microorganisms in Marine and Freshwater Sediments," Applied and Environmental Microbiology, Volume 65, Number 5, May 1995, pages 1888– 1896.

10. Wildermuth Environmental, Inc., "TIN/TDS Study - Phase 2B of the Santa Ana Watershed, Wasteload Allocation Investigation Memorandum," October 2002.

11. Santa Ana Regional Water Quality Control Board Staff, Reference Stream Study Monitoring Data, Moro Canyon, Crystal Cove State Park, 2004. (Regional Board, 2004)

12. California State Water Resources Control Board, Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List, September 2004.

APPENDIX A

MONITORING DATA

1993, 1996-98, 2002-2004

Table A1: Chino Basin Storm Water Quality Monitoring Data, 1993

Fecal Coliform (MPN/100ml)		
Site ID	**Site Location**	**2–23–93**
1	Cucamonga Ck @ Baseline Ave.	13
2	Cucamonga Ck @ Philadelphia Ave	1600
3	Cucamonga Ck @ Riverside Dr	1600
4	Grove Ave Ch @ Riverside Dr	90
5	Cypress Ch @ Riverside Dr	No data
6	Chino Ck @ Schaeffer Ave	1600
7	Cypress Ch @ Edison Ave	1600
8	Cypress Ch @ Kimball Ave	1600
9	Grove Ave Ch @ Merrill Ave	1600
10	Cucamonga Ck @ Merrill Ave	90
11	Chino Ck @ Pine Ave	500
12	Cypress Ch @ Pine Ave	1600
13	Grove Ave Ch @ Pine Ave	1600
14	Mill Ck @ Chino–Corona Rd	1600
15	Grove Ave Ch @ Prado Park	1600
Total Coliform (MPN/100ml)		
Site ID	**Site Location**	**2–23–93**
1	Cucamonga Ck @ Baseline Ave.	23
2	Cucamonga Ck @ Philadelphia Ave	1600
3	Cucamonga Ck @ Riverside Dr	1600
4	Grove Ave Ch @ Riverside Dr	1600
5	Cypress Ch @ Riverside Dr	No data
6	Chino Ck @ Schaeffer Ave	1600
7	Cypress Ch @ Edison Ave	1600
8	Cypress Ch @ Kimball Ave	1600
9	Grove Ave Ch @ Merrill Ave	1600
10	Cucamonga Ck @ Merrill Ave	500
11	Chino Ck @ Pine Ave	500
12	Cypress Ch @ Pine Ave	1600
13	Grove Ave Ch @ Pine Ave	1600
14	Mill Ck @ Chino–Corona Rd	1600
15	Grove Ave Ch @ Prado Park	1600

Table A2: Chino Basin Storm Water Quality Monitoring Data, 1996–97

Fecal Coliform (MPN/100ml)		Date					
Site ID	Site Location	10–25–96	10–30–96	11–21–96	12–11–96	1–14–97	2–19–97
2	Cucam Ck @ Riverside Dr	1,600	1,600	1,600	300	24,000	500
2a	RP–1 Effluent @ Riverside Dr	4	1,600	500	300	700	20
3	Grove Channel @ Riverside Dr	1,600	1,600	1,600	5,000	160,000	5,000
4	Cypress Channel @ Riverside Dr	1,600	1,600	1,600	1,600	24,000	700
5	Chino Ck @ Chino Ave	300	1,600	1,600	160,000	9,000	300
6	Cypress Channel @ Edison Ave	1,600	1,600	1,600	160,000	160,000	900
7	Grove Channel @ Merrill Ave	1,600	1,600	1,600	9,000	160,000	30,000
8	Cucam Ck @ Merrill Ave	1,600	1,600	1,600	300	3,000	300
9	Grove Channel @ Pine Ave	Dry	1,600	1,600	90,000	160,000	160,000
10	Euclid Channel @ Pine Ave	NS	1,600	1,600	3,500	160,000	160,000
11	Cypress Channel @ Kimball Ave	500	1,600	350	16,000	160,000	11,000
12	Chino Ck @ Pine Ave	1,600	1,600	1,600	160,000	22,000	130
13	Cypress Channel @ Pine Ave	1,600	500	1,600	170	160,000	90,000
14	Grove Channel @ Prado Park	NS	1,600	1,600	1,700	160,000	160,000
15	Mill Ck @ Ch–Corona Rd	1,600	1,600	1,600	24,000	90,000	20
Total Coliform (MPN/100ml)							
Site ID	Site Location	10–25–96	10–30–96	11–21–96	12–11–96	1–14–97	2–19–97
2	Cucam Ck @ Riverside Dr	1,600	1,600	1,600	16,000	90,000	9,000
2a	RP–1 Effluent @ Riverside Dr	240	1,600	1,600	14,000	700	20
3	Grove Channel @ Riverside Dr	1,600	1,600	1,600	16,000	160,000	17,000
4	Cypress Channel @ Riverside Dr	1,600	1,600	1,600	1,600	90,000	1,100
5	Chino Ck @ Chino Ave	300	1,600	1,600	160,000	9,000	1,300
6	Cypress Channel @ Edison Ave	1,600	1,600	1,600	160,000	160,000	900
7	Grove Channel @ Merrill Ave	1,600	1,600	1,600	160,000	160,000	160,000
8	Cucam Ck @ Merrill Ave	1,600	1,600	1,600	1,600	50,000	2,200
9	Grove Channel @ Pine Ave	Dry	1,600	1,600	90,000	160,000	160,000
10	Euclid Channel @ Pine Ave	NS	1,600	1,600	3,500	160,000	160,000
11	Cypress Channel @ Kimball Ave	1,600	1,600	1,600	16,000	160,000	160,000
12	Chino Ck @ Pine Ave	1,600	1,600	1,600	160,000	22,000	210
13	Cypress Channel @ Pine Ave	1,600	900	1,600	16,000	160,000	90,000
14	Grove Channel @ Prado Park	NS	1,600	1,600	160,000	160,000	160,000
15	Mill Ck @ Ch–Corona Rd	1,600	1,600	1,600	160,000	160,000	70

Table A3: Chino Basin Storm Water Quality Monitoring Data, 1997–98

Fecal Coliform (MPN/100ml)						
Site ID	**Site Location**	**12/9/97**	**12/19/97**	**1/9/98**	**1/29/98**	**2/3/98**
2	Cucam Ck @ Riverside Dr	1,600	3,000	50,000	2,300	90,000
2a	RP–1 Effluent @ Riverside Dr	130	130	5,000	160,000	NS
3	Grove Channel @ Riverside Dr	1,600	16,000	9,000	30,000	13,000
4	Cypress Channel @ Riverside Dr	1,600	2,800	16,000	90,000	160,000
5	Chino Ck @ Chino Ave	1,600	16,000	16,000	24,000	30,000
6	Cypress Channel @ Edison Ave	1,600	5,000	16,000	30,000	50,000
7	Grove Channel @ Merrill Ave	1,600	16,000	16,000	160,000	280,000
8	Cucam Ck @ Merrill Ave	1,600	16,000	16,000	8,000	13,000
9	Grove Channel @ Pine Ave	1,600	160,000	160,000	160,000	1,600,000
10	Euclid Channel @ Pine Ave	1,600	16,000	160,000	160,000	170,000
11	Cypress Channel @ Kimball Ave	1,600	16,000	16,000	17,000	110,000
12	Chino Ck @ Pine Ave	1,600	9,000	17,000	50,000	80,000
13	Cypress Channel @ Pine Ave	1,600	160,000	24,000	160,000	900,000
14	Grove Channel @ Prado Park	1,600	160,000	160,000	160,000	1,600,000
15	Mill Ck @ Ch–Corona Rd	1,600	5,000	NS	8,000	30,000
Total Coliform (MPN/100ml)						
Site ID	**Site Location**	**12/9/97**	**12/19/97**	**1/9/98**	**1/29/98**	**2/3/98**
2	Cucam Ck @ Riverside Dr	1,600	16,000	160,000	3,000	160,000
2a	RP–1 Effluent @ Riverside Dr	300	130	9,000	160,000	NS
3	Grove Channel @ Riverside Dr	1,600	16,000	160,000	30,000	160,000
4	Cypress Channel @ Riverside Dr	1,600	16,000	16,000	160,000	160,000
5	Chino Ck @ Chino Ave	1,600	16,000	16,000	30,000	90,000
6	Cypress Channel @ Edison Ave	1,600	16,000	16,000	50,000	90,000
7	Grove Channel @ Merrill Ave	1,600	160,000	16,000	160,000	1,600,000
8	Cucam Ck @ Merrill Ave	1,600	16,000	16,000	90,000	13,000
9	Grove Channel @ Pine Ave	1,600	160,000	160,000	160,000	1,600,000
10	Euclid Channel @ Pine Ave	1,600	16,000	160,000	160,000	500,000
11	Cypress Channel @ Kimball Ave	1,600	16,000	16,000	160,000	900,000
12	Chino Ck @ Pine Ave	1,600	16,000	160,000	160,000	80,000
13	Cypress Channel @ Pine Ave	1,600	160,000	160,000	160,000	1,600,000
14	Grove Channel @ Prado Park	1,600	160,000	160,000	160,000	1,600,000
15	Mill Ck @ Ch–Corona Rd	1,600	16,000	NS	22,000	30,000

Table A4: Middle Santa Ana River Watershed Bacterial Indicator TMDL Monitoring Data, February 2002

F. Coli (CFU/100ml)						
Site ID	**Location**	**2–5–02**	**2–7–02**	**2–13–02**	**2–20–02**	**2–27–02**
C1	Icehouse Cyn Ck	9	10	10	10	10
C2	Chino Ck @ Schaeffer Ave.	8,400	960	6,400	8,000	1,100
C3	Prado Pk Lake	350	360	220	310	250
C4	Chino Ck Above Wetlands	520	400	200	130	300
C5	OC Wetlands Effluent	60	180	150	210	270
C6	Ch. Ck Below Wetlands	NA	NA	NA	NA	1,600
M1	Cucam. Ck. @ CCWD Ponds	10	10	9	10	10
M2	Cucam Ck @ RP–1	6,600	2,300	13,000	7,100	4,700
M3	Bon View & Merrill	42,000	2,600	2,100	110,000	900
M4	Archibald & Cloverdale	NA	NA	NA	NA	NA
M5	Mill Ck @ Ch–Cor. Rd	260	1,240	410	200	120
S1	SAR @ MWD Xing	90	50	100	150	100
S2	SAR Below Prado Dam	20	30	90	400	710
T. Coli (CFU/100ml)						
Site ID	**Location**	**2–5–02**	**2–7–02**	**2–13–02**	**2–20–02**	**2–27–02**
C1	Icehouse Cyn Ck	690	600	450	420	660
C2	Chino Ck @ Schaeffer Ave.	130,000	14,000	28,000	22,000	5,400
C3	Prado Pk Lake	800	300	590	510	560
C4	Chino Ck Above Wetlands	1,000	8,000	380	470	1,100
C5	OC Wetlands Effluent	4,300	2,100	3,700	5,300	2,700
C6	Ch. Ck Below Wetlands	NA	NA	NA	NA	4,400
M1	Cucam. Ck. @ CCWD Ponds	810	700	710	620	650
M2	Cucam Ck @ RP–1	110,000	360,000	490,000	220,000	4,900
M3	Bon View & Merrill	720,000	350,000	220,000	5,900,000	390,000
M4	Archibald & Cloverdale	NA	NA	NA	NA	NA
M5	Mill Ck @ Ch–Cor. Rd	4,600	26,000	24,000	2,900	910
S1	SAR @ MWD Xing	5,200	390	4,600	5,600	3,900
S2	SAR Below Prado Dam	2,300	1,500	2,300	13,000	2,900

Table A5: Middle Santa Ana River Watershed Bacterial Indicator TMDL Monitoring Data, March 2002

F. Coli (CFU/100ml)						
Site ID	**Location**	**3–12–02**	**3–14–02**	**3–20–02**	**3–27–02**	**4–3–02**
C1	Icehouse Cyn Ck	10	10	10	10	10
C2	Chino Ck @ Schaeffer Ave.	3,800	830	12,000	20	640
C3	Prado Pk Lake	260	550	120	210	140
C4	Chino Ck Above Wetlands	320	510	70	140	180
C5	OC Wetlands Effluent	230	270	140	180	260
C6	Ch. Ck Below Wetlands	NA	630	290	10	80
M1	Cucam. Ck. @ CCWD Ponds	10	10	10	10	10
M2	Cucam Ck @ RP–1	2,500	3,100	3,900	2,400	6,000
M3	Bon View & Merrill	7,500	5,000	160,000	110,000	NA
M4	Archibald & Cloverdale	NA	NA	NA	NA	NA
M5	Mill Ck @ Ch–Cor. Rd	160	110	120	140	170
S1	SAR @ MWD Xing	480	180	130	160	110
S2	SAR Below Prado Dam	420	510	530	60	130
T. Coli (CFU/100ml)						
Site ID	**Location**	**3–12–02**	**3–14–02**	**3–20–02**	**3–27–02**	**4–3–02**
C1	Icehouse Cyn Ck	560	570	420	360	570
C2	Chino Ck @ Schaeffer Ave.	127,000	68,000	1,000,000	410	7,300
C3	Prado Pk Lake	53,000	3,800	1,200	5,900	100
C4	Chino Ck Above Wetlands	2,400	2,200	2,600	4,800	4,400
C5	OC Wetlands Effluent	6,300	4,000	4,200	2,200	28,000
C6	Ch. Ck Below Wetlands	NA	22,000	36,000	22,000	3,400
M1	Cucam. Ck. @ CCWD Ponds	480	450	300	310	330
M2	Cucam Ck @ RP–1	71,000	63,000	830,000	110,000	86,000
M3	Bon View & Merrill	320,000	330,000	9,200,000	5,000,000	NA
M4	Archibald & Cloverdale	NA	NA	NA	NA	NA
M5	Mill Ck @ Ch–Cor. Rd	27,000	13,000	3,600	570	2,200
S1	SAR @ MWD Xing	9,000	5,200	4,700	7,100	33,000
S2	SAR Below Prado Dam	3,400	5,700	79,000	2,000	2,900

Table A6: Middle Santa Ana River Watershed Bacterial Indicator TMDL Monitoring Data, July 2002

F. Coli (CFU/100ml)						
Site ID	**Location**	**7–10–02**	**7–17–02**	**7–24–02**	**7–31–02**	**8–7–02**
C1	Icehouse Cyn Ck	60	90	20	9	120
C2	Chino Ck @ Schaeffer Ave.	12,000	3,000	8,000	1,100	90
C3	Prado Pk Lake	130	50	200	120	130
C4	Chino Ck Above Wetlands	180	120	270	90	190
C5	OC Wetlands Effluent	960	1,100	590	500	1,650
C6	Ch. Ck Below Wetlands	480	500	1,200	700	500
M1	Cucam. Ck. @ CCWD Ponds	40	60	10	20	20
M2	Cucam Ck @ RP–1	4,500	19,000	50,000	16,000	30,000
M3	Bon View & Merrill	Dry	Dry	Dry	Dry	Dry
M4	Archibald & Cloverdale	Dry	Dry	Dry	Dry	Dry
M5	Mill Ck @ Ch–Cor. Rd	1,800	2,000	1,000	800	1,000
S1	SAR @ MWD Xing	510	390	330	260	120
S2	SAR Below Prado Dam	330	500	500	500	1,000
T. Coli (CFU/100ml)						
Site ID	**Location**	**7–10–02**	**7–17–02**	**7–24–02**	**7–31–02**	**8–7–02**
C1	Icehouse Cyn Ck	600	1,800	550	370	910
C2	Chino Ck @ Schaeffer Ave.	15,000	20,000	20,000	1,200	2,000
C3	Prado Pk Lake	1,800	9,900	2,500	5,000	7,000
C4	Chino Ck Above Wetlands	2,000	6,000	9,000	2,800	4,000
C5	OC Wetlands Effluent	2,300	14,000	3,100	3,900	3,200
C6	Ch. Ck Below Wetlands	3,100	8,000	3,300	1,200	2,600
M1	Cucam. Ck. @ CCWD Ponds	800	500	210	300	100
M2	Cucam Ck @ RP–1	70,000	40,000	140,000	60,000	120,000
M3	Bon View & Merrill	Dry	Dry	Dry	Dry	Dry
M4	Archibald & Cloverdale	Dry	Dry	Dry	Dry	Dry
M5	Mill Ck @ Ch–Cor. Rd	17,000	3,000	11,000	700	5,000
S1	SAR @ MWD Xing	43,000	110,000	68,000	28,000	32,000
S2	SAR Below Prado Dam	4,600	10,000	2,900	1,700	2,400

Table A7: Middle Santa Ana River Watershed Bacterial Indicator TMDL Monitoring Data, September 2002

F. Coli (CFU/100ml)						
Site ID	**Location**	**9–11–02**	**9–18–02**	**9–25–02**	**10–2–02**	**10–9–02**
C1	Icehouse Cyn Ck	200	100	NS fire	9,400	30
C2	Chino Ck @ Schaeffer Ave.	360	3,200	10	90	4,200
C3	Prado Pk Lake	NS Lk dry	NS Lk dry	NS Lk dry	1,000	170
C4	Chino Ck Above Wetlands	790	880	400	2,000	160
C5	OC Wetlands Effluent	870	4,600	1,100	2,000	540
C6	Ch. Ck Below Wetlands	340	570	1,000	560	480
M1	Cucam. Ck. @ CCWD Ponds	30	20	9	50	10
M2	Cucam Ck @ RP–1	10,000	4,800	13,000	11,000	9,000
M3	Bon View & Merrill	Dry	Dry	Dry	Dry	Dry
M4	Archibald & Cloverdale	Dry	Dry	Dry	Dry	Dry
M5	Mill Ck @ Ch–Cor. Rd	1,600	1,000	1,800	2,000	700
S1	SAR @ MWD Xing	370	300	500	640	510
S2	SAR Below Prado Dam	320	440	450	450	250
T. Coli (CFU/100ml)						
Site ID	**Location**	**9–11–02**	**9–18–02**	**9–25–02**	**10–2–02**	**10–9–02**
C1	Icehouse Cyn Ck	6,900	14,000	NS fire	1,200	6,800
C2	Chino Ck @ Schaeffer Ave.	2,500	17,000	80	65,000	22,000
C3	Prado Pk Lake	NS Lk dry	NS Lk dry	NS Lk dry	3,200	800
C4	Chino Ck Above Wetlands	1,200	1,000	300	5,600	2,000
C5	OC Wetlands Effluent	4,200	49,000	41,000	22,000	50,000
C6	Ch. Ck Below Wetlands	1,500	2,700	1,000	2,000	8,000
M1	Cucam. Ck. @ CCWD Ponds	70	3,300	150	130	130
M2	Cucam Ck @ RP–1	30,000	45,000	61,000	50,000	51,000
M3	Bon View & Merrill	Dry	Dry	Dry	Dry	Dry
M4	Archibald & Cloverdale	Dry	Dry	Dry	Dry	Dry
M5	Mill Ck @ Ch–Cor. Rd	1,300	10,000	4,300	4,600	4,000
S1	SAR @ MWD Xing	14,200	37,000	49,000	21,000	67,000
S2	SAR Below Prado Dam	1,500	2,500	3,000	3,500	4,000

Table A8: Middle Santa Ana River Watershed Bacterial Indicator TMDL Monitoring Data, January/February 2003

F. Coli (CFU/100ml)						
Site ID	**Location**	**1–8–03**	**1–15–03**	**1–22–03**	**1–29–03**	**2–5–03**
C1	Icehouse Cyn Ck	9	9	10	10	10
C2	Chino Ck @ Schaeffer Ave.	700	570	1,600	2,000	350
C3	Prado Pk Lake	120	180	900	480	160
C4	Chino Ck Above Wetlands	280	170	310	310	320
C5	OC Wetlands Effluent	240	510	360	430	670
C6	Ch. Ck Below Wetlands	NS	NS	NS	80	250
M1	Cucam. Ck. @ CCWD Ponds	9	9	10	10	10
M2	Cucam Ck @ RP–1	20,000	16,000	13,000	2,200	1,200
M3	Bon View & Merrill	Dry	Dry	Dry	Dry	Dry
M4	Archibald & Cloverdale	Dry	Dry	Dry	Dry	Dry
M5	Mill Ck @ Ch–Cor. Rd	510	400	570	420	240
S1	SAR @ MWD Xing	210	140	160	90	420
S2	SAR Below Prado Dam	20	30	20	160	230
T. Coli (CFU/100ml)						
Site ID	**Location**	**1–8–03**	**1–15–03**	**1–22–03**	**1–29–03**	**2–5–03**
C1	Icehouse Cyn Ck	790	660	690	1,000	490
C2	Chino Ck @ Schaeffer Ave.	160,000	12,000	33,000	40,000	28,000
C3	Prado Pk Lake	2,000	1,000	5,400	500	100
C4	Chino Ck Above Wetlands	1,000	800	1,000	700	1,000
C5	OC Wetlands Effluent	5,800	12,000	7,600	5,000	8,600
C6	Ch. Ck Below Wetlands	NS	NS	NS	700	3,000
M1	Cucam. Ck. @ CCWD Ponds	680	450	550	310	380
M2	Cucam Ck @ RP–1	800,000	290,000	460,000	130,000	83,000
M3	Bon View & Merrill	Dry	Dry	Dry	Dry	Dry
M4	Archibald & Cloverdale	Dry	Dry	Dry	Dry	Dry
M5	Mill Ck @ Ch–Cor. Rd	54,000	3,500	4,400	3,000	3,800
S1	SAR @ MWD Xing	4,800	2,500	2,800	4,400	4,400
S2	SAR Below Prado Dam	220	100	100	1,000	2,500

Table A9: Middle Santa Ana River Watershed Bacterial Indicator TMDL Monitoring Data, March/April 2003

F. Coli (CFU/100ml)						
Site ID	**Location**	**3–12–03**	**3–19–03**	**3–26–03**	**4–2–03**	**4–9–03**
C1	Icehouse Cyn Ck	10	10	10	10	10
C2	Chino Ck @ Schaeffer Ave.	330	15,000	160	580	4,800
C3	Prado Pk Lake	290	8,200	280	330	120
C4	Chino Ck Above Wetlands	240	6,000	2,800	170	370
C5	OC Wetlands Effluent	540	470	90	30	480
C6	Ch. Ck Below Wetlands	NS	NS	NS	NS	NS
M1	Cucam. Ck. @ CCWD Ponds	10	20	10	10	10
M2	Cucam Ck @ RP–1	220	700	10	70	380
M3	Bon View & Merrill	NS	5,200,000	150,000	NS	NS
M4	Archibald & Cloverdale	NS	NS	NS	NS	NS
M5	Mill Ck @ Ch–Cor. Rd	310	9,000	30	16,000	400
S1	SAR @ MWD Xing	270	590	210	70	90
S2	SAR Below Prado Dam	10	710	30	370	220
T. Coli (CFU/100ml)						
Site ID	**Location**	**3–12–03**	**3–19–03**	**3–26–03**	**4–2–03**	**4–9–03**
C1	Icehouse Cyn Ck	180	310	310	180	210
C2	Chino Ck @ Schaeffer Ave.	22,000	230,000	42,000	86,000	94,000
C3	Prado Pk Lake	290	16,000	23,000	8,800	5,600
C4	Chino Ck Above Wetlands	390	65,000	52,000	5,600	17,000
C5	OC Wetlands Effluent	23,000	24,000	120,000	32,000	17,000
C6	Ch. Ck Below Wetlands	NS	NS	NS	NS	NS
M1	Cucam. Ck. @ CCWD Ponds	320	470	530	320	220
M2	Cucam Ck @ RP–1	96,000	14,000	750	9,400	108,000
M3	Bon View & Merrill	NS	5,700,000	2,900,000	NS	NS
M4	Archibald & Cloverdale	NS	NS	NS	NS	NS
M5	Mill Ck @ Ch–Cor. Rd	15,000	150,000	3,500	61,000	8,000
S1	SAR @ MWD Xing	5,200	17,000	6,200	4,300	790
S2	SAR Below Prado Dam	390	9,600	2,300	2,800	660

Table A10: Middle Santa Ana River Watershed Bacterial Indicator TMDL Monitoring Data, January/February 2004

F. Coli (CFU/100ml)						
Site ID	**Location**	**1-7-04**	**1-14-04**	**1-21-04**	**1-28-04**	**2-4-04**
C1	Icehouse Cyn Ck	99	9	NS	9	9
C2	Chino Ck @ Schaeffer Ave.	1000	1,170	430	20	50
C3	Prado Pk Lake	99	380	90	110	50
C7	Chino Ck @ Central	290	160	130	60	220
C8	Chino Ck @ Prado GC	90	500	560	170	2,900
M1	Cucam. Ck. @ CCWD Ponds	9	9	9	9	9
M2	Cucam Ck @ RP–1	1,500	3,500	9,300	470	2,800
M3	Bon View & Merrill	NS	NS	NS	NS	NS
M4	Archibald & Cloverdale	NS	NS	NS	NS	NS
M5	Mill Ck @ Ch–Cor. Rd	110	270	5,700	100	360
S1	SAR @ MWD Xing	200	180	140	99	390
S2	SAR Below Prado Dam	9	9	20	20	3,200
S3	SAR @ Hamner	170.0	170.0	140.0	150.0	500.0
T. Coli (CFU/100ml)						
Site ID	**Location**	**1-7-04**	**1-14-04**	**1-21-04**	**1-28-04**	**2-4-04**
C1	Icehouse Cyn Ck	4,100	340	NS	380	290
C2	Chino Ck @ Schaeffer Ave.	21,000	67,000	48,000	970	2,600
C3	Prado Pk Lake	200	9,600	400	800	160
C7	Chino Ck @ Central	5,100	14,800	15,500	2,900	5,200
C8	Chino Ck @ Prado GC	4,200	3,600	37,000	3,200	22,000
M1	Cucam. Ck. @ CCWD Ponds	800	1,300	1,100	230	400
M2	Cucam Ck @ RP–1	340,000	270,000	4,100,000	250,000	390,000
M3	Bon View & Merrill	NS	NS	NS	NS	NS
M4	Archibald & Cloverdale	NS	NS	NS	NS	NS
M5	Mill Ck @ Ch–Cor. Rd	17,000	500	2,600,000	7,700	8,600
S1	SAR @ MWD Xing	3,400	200	2,400	2,700	25,000
S2	SAR Below Prado Dam	610	1,000	450	560	105,000
S3	SAR @ Hamner	3,500	2,200	3,000	3,700	45,000

Table A11: Middle Santa Ana River Watershed Bacterial Indicator TMDL Monitoring Data, February/March 2004

F. Coli (CFU/100ml)						
Site ID	**Location**	**2–11–04**	**2–18–04**	**2–25–04**	**3–3–04**	**3–10–04**
C1	Icehouse Cyn Ck	9	9	30	9	9
C2	Chino Ck @ Schaeffer Ave.	890	140	30	210	220
C3	Prado Pk Lake	80	50	40	170	140
C7	Chino Ck @ Central	40	230	90	240	120
C8	Chino Ck @ Prado GC	520	470	430	8,400	120
M1	Cucam. Ck. @ CCWD Ponds	9	9	NS	9	9
M2	Cucam Ck @ RP–1	930	1,230	410	320	9
M3	Bon View & Merrill	NS	NS	66,000	32,000	NS
M4	Archibald & Cloverdale	NS	NS	NS	NS	NS
M5	Mill Ck @ Ch–Cor. Rd	220	160	230	450	120
S1	SAR @ MWD Xing	150.0	80	200	9,100	99
S2	SAR Below Prado Dam	40	20	340	210	9
S3	SAR @ Hamner	140	170	130	7,800	160
T. Coli (CFU/100ml)						
Site ID	**Location**	**2–11–04**	**2–18–04**	**2–25–04**	**3–3–04**	**3–10–04**
C1	Icehouse Cyn Ck	250	290	290	140	200
C2	Chino Ck @ Schaeffer Ave.	16,900	2,900	3,500	250	90
C3	Prado Pk Lake	400	3,800	3,000	210	90
C7	Chino Ck @ Central	1,400	25,000	5,000	150	600
C8	Chino Ck @ Prado GC	4,300	2,400	14,100	1,900	400
M1	Cucam. Ck. @ CCWD Ponds	40	140	NS	9	30
M2	Cucam Ck @ RP–1	104,000	162,000	28,000	5,300	1,400
M3	Bon View & Merrill	NS	NS	220,000	140,000	NS
M4	Archibald & Cloverdale	NS	NS	NS	NS	NS
M5	Mill Ck @ Ch–Cor. Rd	6,900	11,200	10,700	2,500	600
S1	SAR @ MWD Xing	940.0	2,500	4,800	1,500	1,200
S2	SAR Below Prado Dam	2,200	420	6,600	260	200
S3	SAR @ Hamner	2,400	2,200	8,600	1,400	600

Table A12: Middle Santa Ana River Watershed Bacterial Indicator TMDL Monitoring Data, March/April 2004

F. Coli (CFU/100ml)						
Site ID	**Location**	**3–17–04**	**3–24–04**	**3–31–04**	**4–7–04**	**4–14–04**
C1	Icehouse Cyn Ck	9	9	9	9	9
C2	Chino Ck @ Schaeffer Ave.	9	480	20	330	140
C3	Prado Pk Lake	9	9	40	20	70
C7	Chino Ck @ Central	160	80	120	380	530
C8	Chino Ck @ Prado GC	120	250	350	420	460
M1	Cucam. Ck. @ CCWD Ponds	9	NS	9	9	9
M2	Cucam Ck @ RP–1	300	230	700	400	310
M3	Bon View & Merrill	NS	NS	NS	NS	NS
M4	Archibald & Cloverdale	NS	NS	NS	NS	NS
M5	Mill Ck @ Ch–Cor. Rd	9	130	180	340	300
S1	SAR @ MWD Xing	160.0	NS	50	210	90
S2	SAR Below Prado Dam	9	20	290	20	9
S3	SAR @ Hamner	140	99	70	200	80
T. Coli (CFU/100ml)						
Site ID	**Location**	**3–17–04**	**3–24–04**	**3–31–04**	**4–7–04**	**4–14–04**
C1	Icehouse Cyn Ck	500	470	270	140	130
C2	Chino Ck @ Schaeffer Ave.	30	2,100	200	2,300	140
C3	Prado Pk Lake	90	25,000	1,400	60	60
C7	Chino Ck @ Central	1,000	1,900	1,100	2,500	2,000
C8	Chino Ck @ Prado GC	700	1,600	2,000	320	1,000
M1	Cucam. Ck. @ CCWD Ponds	40	NS	40	90	100
M2	Cucam Ck @ RP–1	2,100	28,000	11,000	1,900	2,700
M3	Bon View & Merrill	NS	NS	NS	NS	NS
M4	Archibald & Cloverdale	NS	NS	NS	NS	NS
M5	Mill Ck @ Ch–Cor. Rd	70	300	13,000	2,300	300
S1	SAR @ MWD Xing	210	NS	140	320	140
S2	SAR Below Prado Dam	50	20	300	220	80
S3	SAR @ Hamner	1,400	1,260	300	2,100	140

APPENDIX B

PRECIPITATION DATA

Figure B1: 1992–93 Rainfall Data
San Bernardino County Flood Control District Rain Gauge #1347 (Montclair)

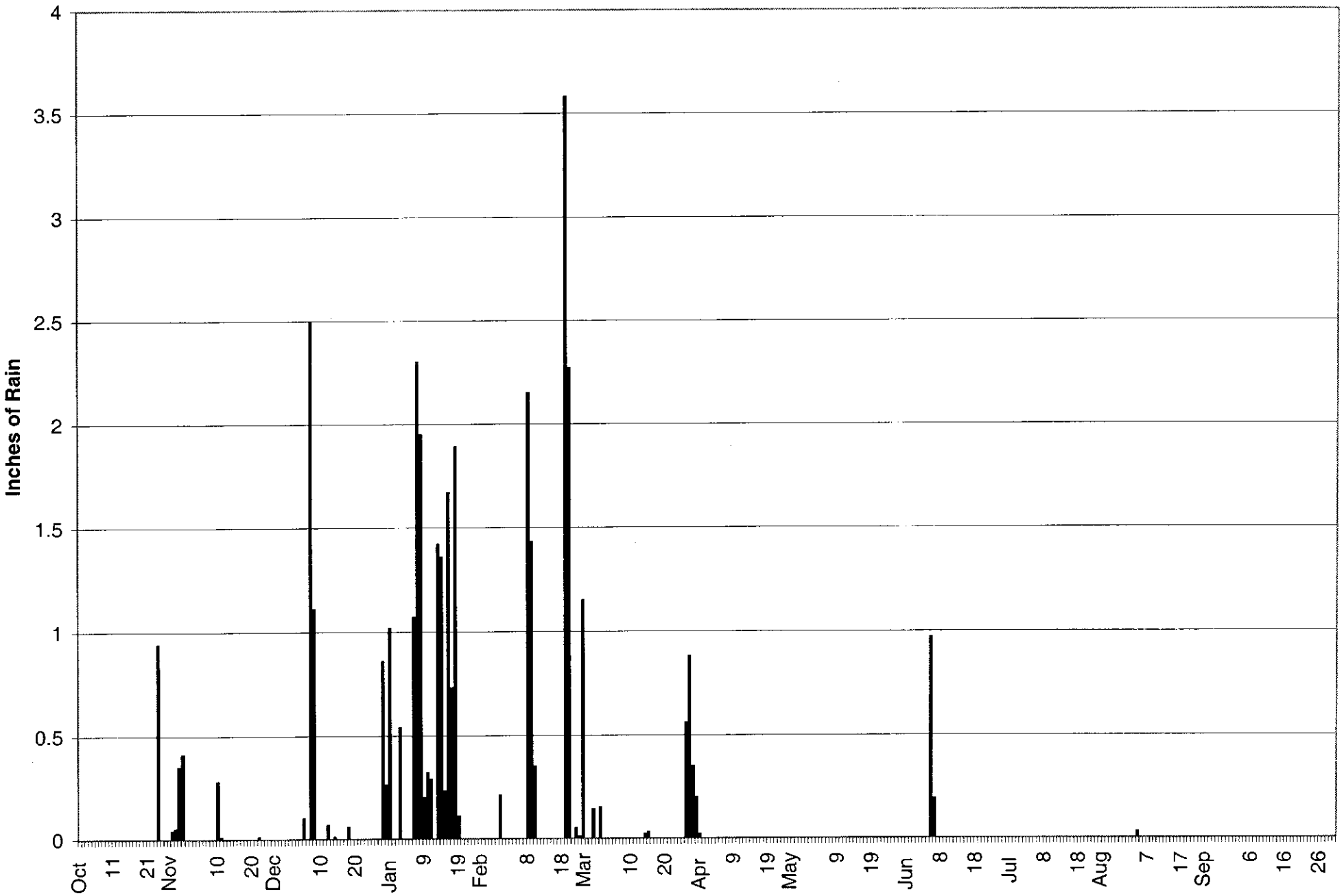


Figure B2: 1996–97 Rainfall Data
San Bernardino County Flood Control District Rain Gauge #1347 (Montclair)

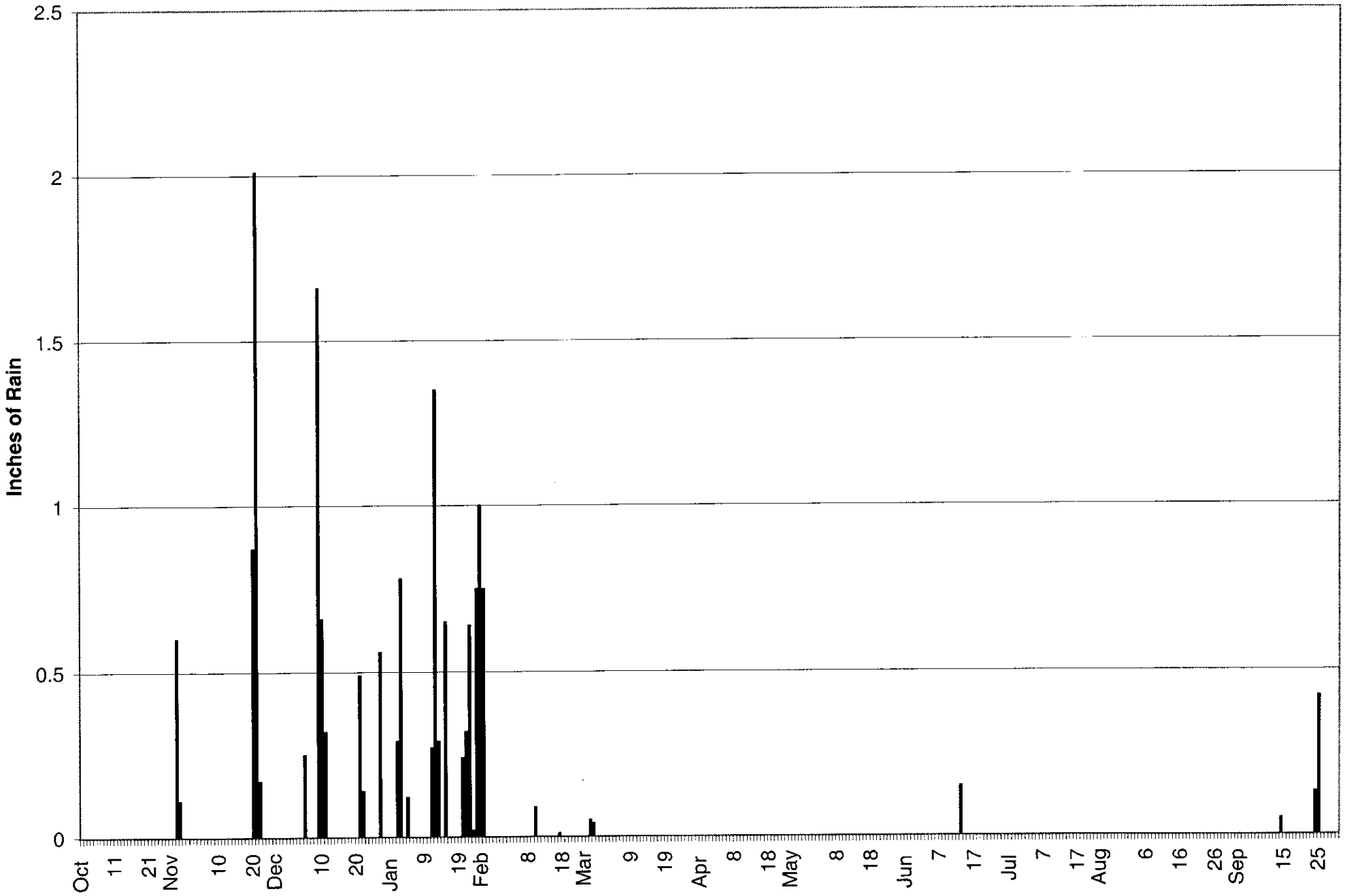


Figure B3: 1997–98 Rainfall Data
San Bernardino County Flood Control District Rain Gauge #1347 (Montclair)

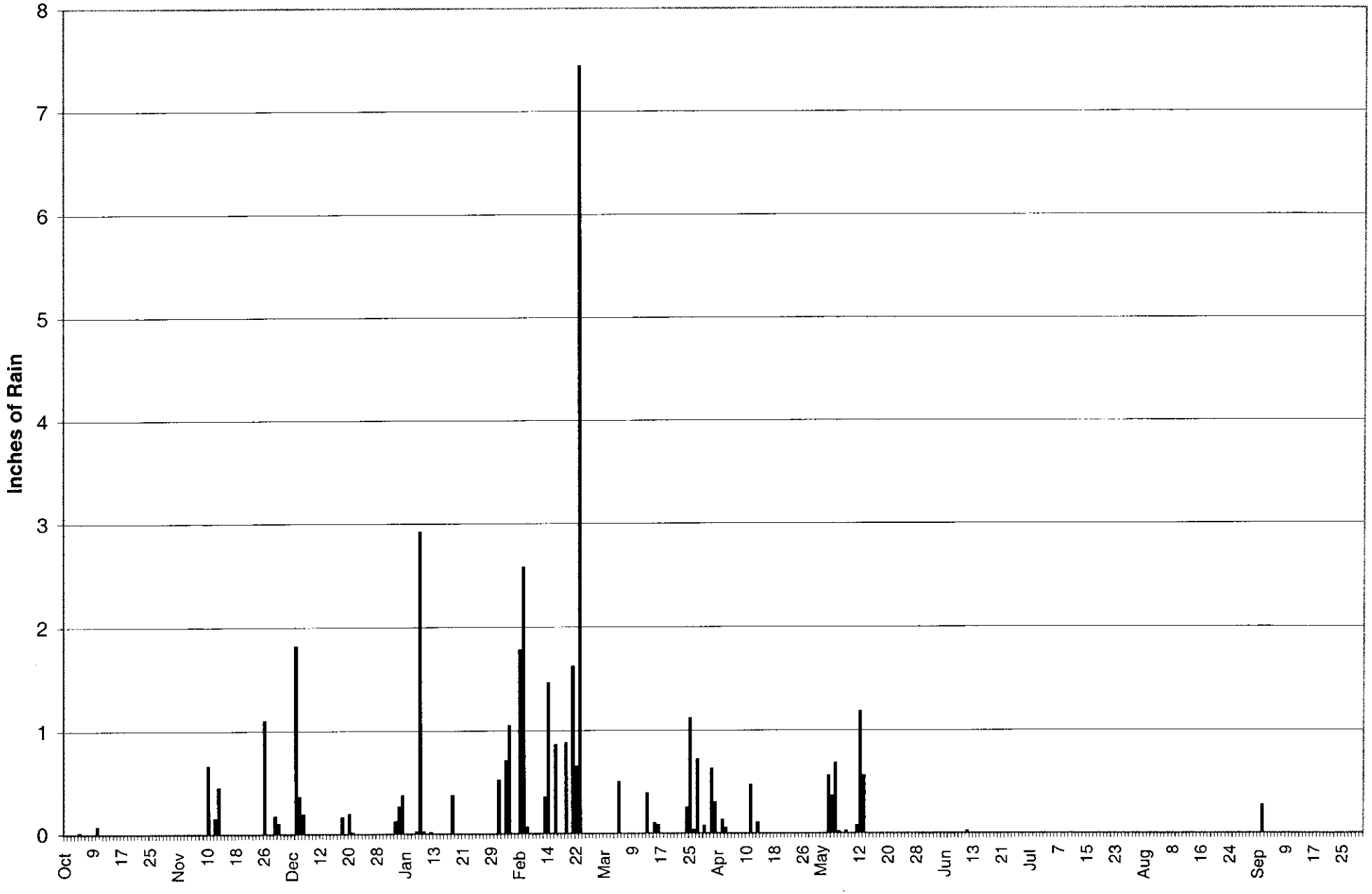


Figure B4: 2001–02 Rainfall Data
San Bernardino County Flood Control District Rain Gauge #1347 (Montclair)

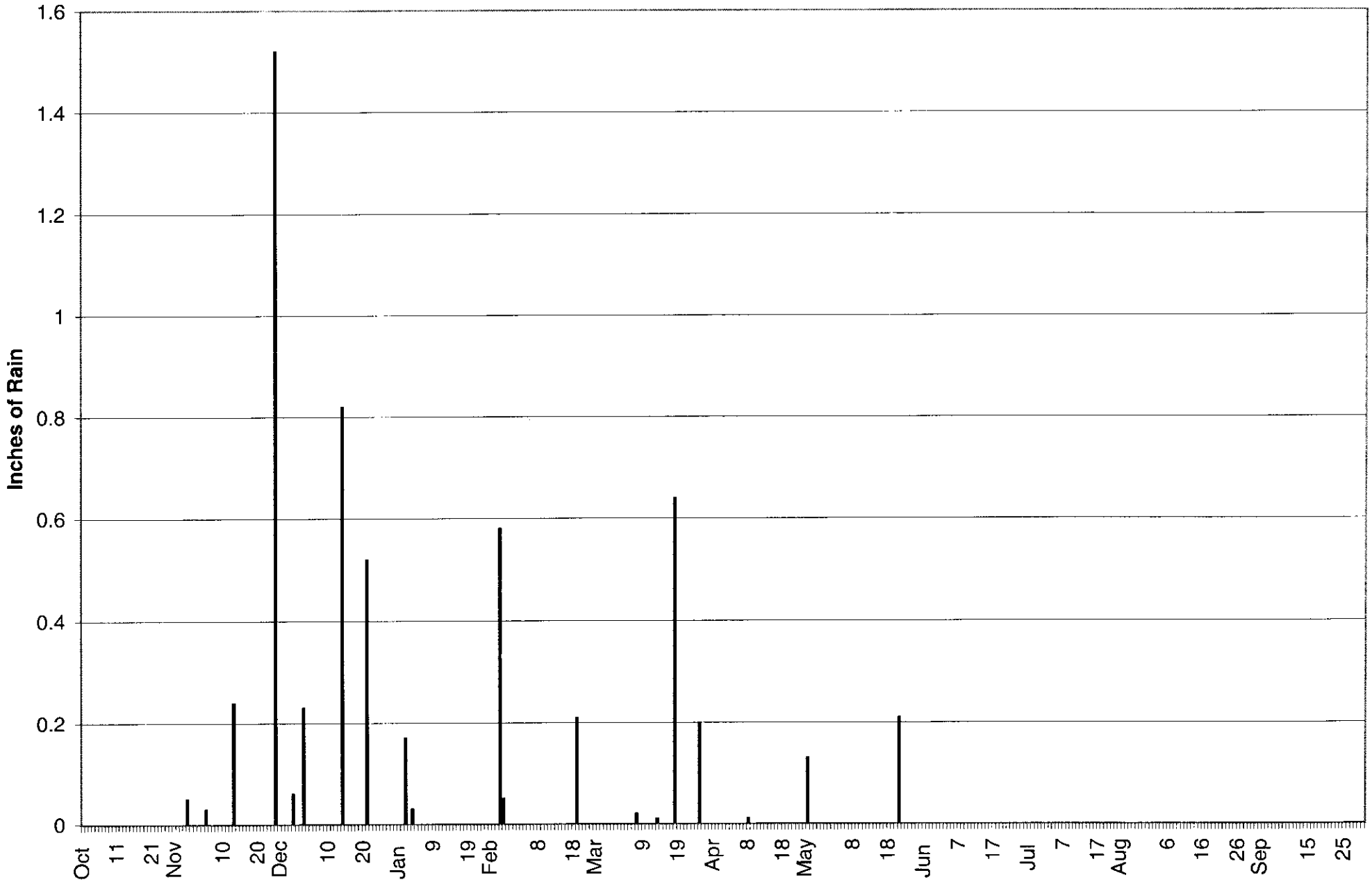
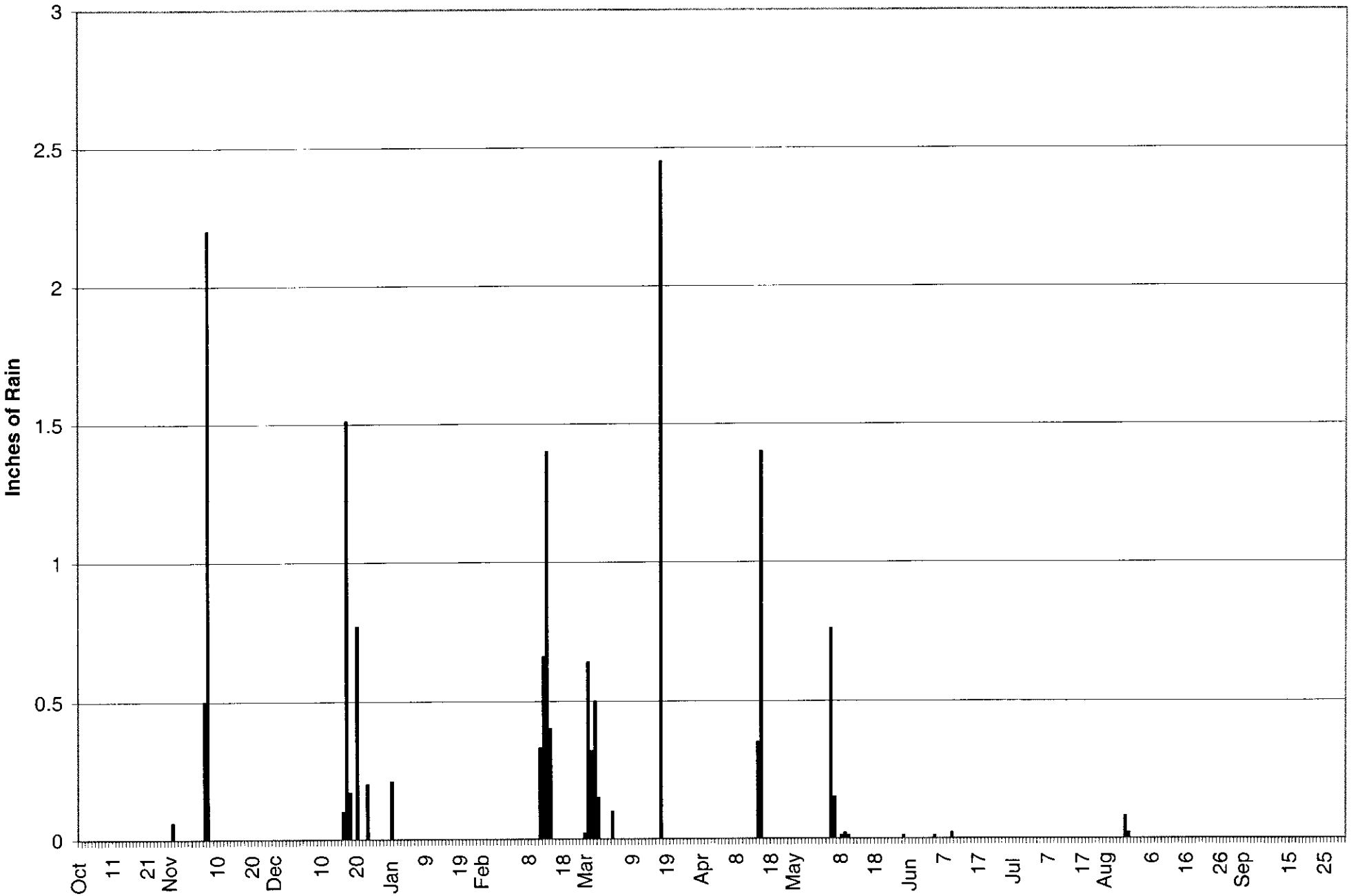


Figure B5: 2002-03 Rainfall Data
San Bernardino County Flood Control District Rain Gauge #1347 (Montclair)



ATTACHMENT A

BASIN PLAN AMENDMENT

ATTACHMENT A

Resolution No. R8 – 2005–0001

To be submitted at a later date

ATTACHMENT TO RESOLUTION NO. R8 2005–0001

Amendment to the Santa Ana Region Basin Plan

Chapter 5 - Implementation Plan

(NOTE: The following language is proposed to be inserted into Chapter 5 of the Basin Plan. If the amendments are approved, corresponding changes will be made to the Table of Contents, the List of Tables, page numbers, and page headers in the plan. Due to the two-column page layout of the Basin Plan, the location of tables in relation to text may change during final formatting of the amendments. For formatting purposes, the maps may be redrawn for inclusion in the Basin Plan, and the final layout may differ from that of the draft.)

Middle Santa Ana River Watershed

The Middle Santa Ana River Watershed covers approximately 488 square miles and lies largely in the southwestern corner of San Bernardino County, and the northwestern corner of Riverside County. A small part of Los Angeles County (Pomona/Claremont area) is also included. This watershed is comprised of three sub–watersheds. The first sub-watershed is the Chino Basin Watershed, which includes portions of San Bernardino County, Los Angeles County, and Riverside County. Surface drainage in this area is directed to Chino Creek and Cucamonga/Mill Creek and is generally southward, from the San Gabriel Mountains toward the Santa Ana River and the Prado Flood Control Basin. The second sub–watershed, the Riverside Watershed, is located in Riverside County. Surface drainage in this area is generally westward from the City of Riverside to the Santa Ana River, Reach 3. The final sub–watershed, the Temescal Canyon Watershed, is also located in Riverside County. Surface drainage in this area is generally northward to Temescal Creek.

Land uses in the Middle Santa Ana River watershed include urban, agriculture, and open space . Although originally developed as an agricultural area, the watershed is being steadily urbanized. Incorporated cities in the Middle Santa Ana River watershed include Pomona, Chino Hills, Upland, Montclair, Claremont, Ontario, Rancho Cucamonga, Rialto, Chino, Fontana, Norco, Corona, and Riverside. In addition, there are several pockets of urbanized unincorporated areas. The current population of the watershed, based upon 2000 census data, is approximately 1.4 million people. The principal remaining agricultural area in the watershed is the area formerly known as the Chino Dairy Preserve. This area is located in the south–central part of the Chino Basin watershed and contains approximately 300,000 cows, which generate the waste equivalent of more than two million people. Recently, the cities of Ontario and Chino annexed the San Bernardino County portions of this area. The remaining portion of the former preserve, which is in Riverside County, remains unincorporated. Open space areas include National Forest lands and State Parks lands.

Middle Santa Ana River Watershed waterbodies listed on the 303(d) list for bacterial indicators addressed by this TMDL are shown in Table 5-9w.

Table 5-9w – Middle Santa Ana River Watershed 303(d) Waterbodies on the 303(d) List Due to Bacterial Contamination

Waterbody, Reach
Santa Ana River, Reach 3
Chino Creek, Reach 1
Chino Creek, Reach 2
Mill Creek (Prado Area)
Cucamonga Creek, Reach 1
Prado Park Lake

Middle Santa Ana River Watershed Bacterial Indicator Total Maximum Daily Load (TMDL)

Middle Santa Ana River Watershed waterbodies shown in Table 5-9w are not attaining water quality standards due to excessive bacterial indicator densities (fecal coliform). During storm events, these waterbodies receive and transport runoff from urban, agricultural, and open space areas. During dry weather, these waterbodies receive and transport nuisance runoff, primarily from urban areas. Based on monitoring results, and observed waterbody conditions (fish kills and waste-laden stormflows), the Regional Board, from 1988 to 1998, placed these waterbodies on the 303(d) list of impaired waters due to excessive levels of bacterial indicators.
A TMDL technical report prepared by Regional Board staff describes the bacterial indicator related problems in the Middle Santa Ana River Watershed waterbodies in greater detail and discusses the technical basis for the TMDLs that follow [Ref. # 1].

A. Middle Santa Ana River Watershed Bacterial Indicator TMDL Numeric Targets

Bacterial indicator numeric targets for the Middle Santa Ana River Watershed waterbodies shown in Table 5-9w are based on the fecal coliform water quality objective specified in Chapter 4 for the protection of body-contact recreation (REC1) in inland surface waters. This numeric target is specified as follows:

> Fecal coliform: log mean less than 200 organisms/100 mL based on five or more samples per 30 day period, and not more than 10% of the samples exceed 400 organisms/100 mL for any 30-day period.

B. Middle Santa Ana River Watershed Bacterial Indicator TMDLs, Wasteload Allocations, Load Allocations and Compliance Dates

As discussed in the technical TMDL Report, the bacterial indicator TMDL is expressed in terms of density since it is the number of organisms in a given volume of water (i.e., their density), and not their mass that is significant with respect to public health and the protection of beneficial uses. Similarly the wasteload allocations for point source discharges (WLAs) and load allocations for nonpoint source discharges (LAs) are also based on density. The density–based WLAs and LAs do not add up to equal the TMDL, since this is not scientifically valid. To achieve the density–based TMDL, it is simply necessary to assure that each WLA and LA itself meets the density–based TMDL. As indicated in Table 5-9x, the TMDL, WLAs and LAs specified are equivalent to the existing Basin Plan fecal coliform objective for REC1 for inland surface waters. WLAs are specified for urban and agricultural runoff, including stormwater, while LAs are specified for runoff from other types of agriculture and from natural sources (open space/undeveloped forest land).

Table 5-9x – Total Maximum Daily Load, Waste Load Allocations, and Load Allocations for Fecal Coliform in Middle Santa Ana River Waterbodies[a]

Total Maximum Daily Load for Fecal Coliform	Waste Load Allocation for Fecal Coliform in Urban Runoff including stormwater discharges	Waste Load Allocation for Fecal Coliform in Confined Animal Feeding Operations discharges	Load Allocation for Fecal Coliform in Agricultural runoff discharges	Load Allocations for Fecal Coliform from Natural Sources
5–sample/30–days Logarithmic Mean less than 200 organisms/100ml, and not more than 10% of the samples exceed 400 organisms/100ml for any 30–day period.	5–sample/30–days Logarithmic Mean less than 200 organisms/100ml, and not more than 10% of the samples exceed 400 organisms/100ml for any 30–day period.	5–sample/30–days Logarithmic Mean less than 200 organisms/100ml, and not more than 10% of the samples exceed 400 organisms/100ml for any 30–day period.	5–sample/30–days Logarithmic Mean less than 200 organisms/100ml, and not more than 10% of the samples exceed 400 organisms/100ml for any 30–day period.	5–sample/30–days Logarithmic Mean less than 200 organisms/100ml, and not more than 10% of the samples exceed 400 organisms/100ml for any 30–day period.

[a] To be achieved as soon as possible, but no later than December 31, 2020

C. Margin of Safety

For the Bacterial Indicator TMDL in the Middle Santa Ana River Watershed, a substantial and adequate margin of safety is implicitly incorporated into the TMDL by the fact that the TMDL and allocations do not account for bacteria dilution and organism die–off. In addition, a margin of safety is assumed by applying the existing water quality objectives as the TMDL because conservative methods were used in developing the baseline water quality criteria upon which the water quality objectives are based.

D. Seasonal Variations/Critical Conditions

The Basin Plan REC1 fecal coliform objectives apply year-round; no distinctions based on climate or other conditions that may affect actual REC1 use are specified. To assure that the REC1 objectives are consistently achieved, the TMDL requires compliance with the WLAs and LAs year-round.

E. TMDL Implementation

Implementation is expected to result in compliance with the water quality objectives for fecal coliform and ensure protection of the beneficial uses of Middle Santa Ana River Watershed waterbodies. Collection of additional monitoring data is critical to developing long-term solutions for bacterial indicator control. With that in mind, the requirements for submittal of plans and schedules to implement the TMDLs take into consideration the need to develop and implement effective short-term solutions, as well as allow for the development of long-term solutions once additional data have been generated.

Implementation of tasks and schedules as specified in Table 5-9y is expected to achieve compliance with the TMDL and, thereby, water quality standards. Each of these tasks is described below.

Table 5-9y

Middle Santa Ana River Watershed Bacterial Indicator TMDL
Implementation Plan/Schedule Due Dates

Task	Description	Compliance Date-As soon As Possible but No Later Than
TMDL Phase 1		
Task 1	Revise Existing Waste Discharge Requirements	*(*9 months after BPA approval*)*
Task 2	Identify Agricultural Operators	*(*1 month after BPA approval*)*
Task 3	Develop Watershed-Wide Bacterial Indicator Water Quality Monitoring Program Implement Watershed-Wide Bacterial Indicator Water Quality Monitoring Program	*(*3 months after BPA approval*)* Upon Regional Board approval Quarterly reports due in January, April, July, and October of each year
Task 4	Urban Discharges 4.1 Develop and Implement Bacterial Indicator Urban Source Evaluation Plan 4.2 San Bernardino County MS4: Revise Municipal Storm Water Management Program (MSWMP) 4.3 Riverside County MS4: Revise Drainage Area Management Plan (DAMP) 4.4 San Bernardino County MS4: Revise Water Quality Management Plan (WQMP) 4.5 Riverside County MS4: Revise Water Quality Management Plan (WQMP)	Plan/schedule due 4.1 *(*3 months after BPA approval*)*; 4.2 Within 2 years of approval of the Urban Source Evaluation Plan 4.3 Within 2 years of approval of the Urban Source Evaluation Plan 4.4 Within 2 years of approval of the Urban Source Evaluation Plan 4.5 Within 2 years of approval of the Urban Source Evaluation Plan
Task 5	Agricultural Discharges 5.1 Develop and Implement Bacterial Indicator Agricultural Source Evaluation Plan 5.2 Develop and Implement Bacterial Indicator Agricultural Source Management Plan	Plan/schedule due 5.1 *(*6 months after BPA approval*)*; 5.2 Within 2 years from submittal/approval of Agriculture Source Evaluation Report
Task 6	**Review of TMDL/WLAs/LAs**	Once every 3 years to coincide with the Regional Board's triennial review

[Note: BPA => Basin Plan Amendment]

Task 1: Review and/or Revise Existing Waste Discharge Requirements

There are three Waste Discharge Requirements (WDRs) issued by the Regional Board regulating discharge of various types of wastes in the watershed. On or before (*9 *months from the effective date of this Basin Plan amendment**), each of these WDRs shall be reviewed and revised as necessary to implement the TMDL, including the appropriate wasteload allocations, compliance schedules and/or monitoring program requirements.

1.1 Waste Discharge Requirements for the San Bernardino County Flood Control and Transportation District, the County of San Bernardino and the Incorporated Cities of San Bernardino County within the Santa Ana Region, Areawide Urban Runoff, NPDES No. CAS 618036 (Regional Board Order No. R8-2002-0012). The current Order has provisions to address TMDL issues (see Task 4, below). In light of these provisions, revision of the Order may not be necessary to address TMDL requirements.

1.2 Waste Discharge Requirements for the Riverside County Flood Control and Water Conservation District, the County of Riverside and the Incorporated Cities of Riverside County within the Santa Ana Region, Areawide Urban Runoff, NPDES No. CAS 618033 (Regional Board Order No. R8-2002-0011). The current Order has provisions to address TMDL issues (see Task 4, below). In light of these provisions, revision of the Order may not be necessary to address TMDL requirements.

1.3 General Waste Discharge Requirements for Concentrated Animal Feeding Operations (Dairies and Related Facilities) within the Santa Ana Region, NPDES No. CAG018001 (Regional Board Order No. 99-11). Updated waste discharge requirements for Concentrated Animal Feeding Operations are expected to be considered by the Regional Board in 2005.

Task 2: Identify Agricultural Operators

On or before (*1 *month from the effective date of this BPA*), the Regional Board shall develop a list of all known agricultural owners/operators in the Middle Santa Ana River watershed that will be responsible for implementing requirements of this TMDL. The Regional Board will send a notice to these operators informing them of their TMDL responsibility and alerting them to the potential regulatory consequences of failure to comply.

Task 3: Watershed-Wide Bacterial Indicator Water Quality Monitoring Program

No later than (*3 *months from effective date of this Basin Plan amendment* *), the US Forest Service, the County of San Bernardino, the County of Riverside, the cities of Ontario, Chino, Chino Hills, Montclair, Rancho Cucamonga, Upland, Rialto, Fontana, Norco, Riverside, and Corona, Pomona and Claremont and agricultural operators in the watershed, shall as a group, submit to the Regional Board for approval a proposed watershed-wide monitoring program that will provide data necessary to review and update the TMDL. Data to be collected and analyzed shall address, at a minimum determination of compliance with the TMDL, WLAs and LAs.

At a minimum, the stations specified in Tables 5-9z and 5-9aa and shown in Figure 5-6, at the frequency specified in Tables 5-9z and 5-9aa, shall be considered for inclusion in the proposed monitoring plan. If one or more of these monitoring stations are not included, the rationale shall be provided and proposed alternative monitoring locations shall be identified in the proposed monitoring plan. The proposed monitoring plan shall also include a plan to compile streamflow measurements at existing USGS stream gauging stations.

At a minimum, samples shall be analyzed for the following constituents:

- Fecal Coliform
- Escherichia Coliform (e.coli)
- Enterococcus
- Total Suspended Solids
- Ph
- Temperature
- Electrical Conductivity
- Dissolved Oxygen
- Turbidity

The proposed monitoring plan shall be implemented upon Regional Board approval at a duly noticed public meeting. Quarterly reports summarizing and including copies of the data collected during the monitoring period shall be submitted by the 25th day of the month following the end of each calendar quarter (i.e., January, April, July, and October) of each year.

In lieu of this coordinated monitoring plan, one or more of the parties identified above may submit a proposed individual or group monitoring plan for Regional Board approval. Any such individual or group monitoring plan is due no later than (*3 *months from effective date of this Basin Plan amendment**) and shall be implemented upon Regional Board approval at a duly noticed public meeting. Quarterly reports summarizing and including copies of the data collected during the monitoring period shall be submitted by the 25th day of the month following the end of each calendar quarter (i.e., January, April, July, and October) of each year.

It may be that implementation of these monitoring requirements will be required through the issuance of Water Code Section 13267 letters to the affected parties. The monitoring plan(s) will be considered by the Regional Board and shall be implemented upon the Regional Board's approval.

Table 5-9z

Watershed Minimum Required Weekly Sampling Station Locations

Station Number	Station Description
C1	Icehouse Canyon Creek
C2	Chino Creek at Schaeffer Avenue
C3	Prado Park Lake
C7	Chino Creek at Central Avenue
C8	Chino Creek at Prado Golf Course
M2	Cucamonga Creek at Regional Plant No. 1
M5	Mill Creek at Chino–Corona Road
S1	Santa Ana River at MWD Crossing
S3	Santa Ana River at Hamner Avenue
T1	Temescal Wash
TQ1	Tequesquite Arroyo at Palm Avenue

Frequency of sampling: dry weather – weekly; wet weather – minimum of one sample/storm event for 5 storm events/year.

Table 5-9aa

Additional Watershed Storm Event Sampling Locations

Station Number	Station Description
M3	Bon View Avenue @ Merrill Avenue
M4	Archibald Avenue @ Cloverdale Avenue
G1	Grove Channel @ Pine Avenue
E1	Euclid Avenue Channel @ Pine Avenue

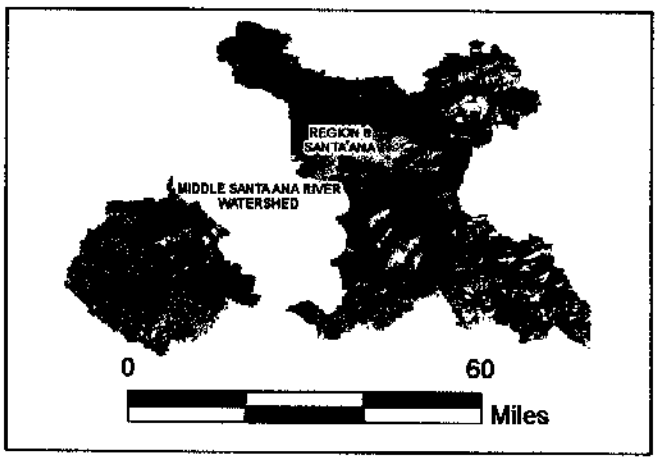
Frequency of sampling: wet weather – one sample/storm event for 5 storm events/year; dry weather – none.

Note: SB county line denotes R8 boundary. A portion of the MSAR watershed is outside of Region 8's boundary.

2002 Region 8 303(d) listed lakes for bacterial indicators
Rivers/Creeks
2002 Region 8 303(d) listed rivers/creeks for bacterial indicators
Lakes
Middle Santa Ana River Watershed
County boundary
Freeways/highways
Major streets
TMDL Water Quality Sampling Locations

C1-Icehouse Cyn
San Antonio Dam
19th
San Antonio Channel
Cucamonga Creek, Reach 1
MISSION
BON VIEW
M2-RP-1
RIVERSIDE
CENTRAL
HAMNER
VAN BUREN
C2-Schaeffer Ave
SCHAEFER
Euclid
Chino Creek Reach 1
MERRILL
M4-Archibald & Cloverdale
M3-Bon View & Merril
CLOVERDALE
TQ1
S1-MWD Xing
LOS SERRANOS
Carbon Canyon
C7-Central Ave
KIMBALL
Chino Creek Reach 2
PINE
E1
G1
ARCHIBALD
S3-Hamner Ave
CHINO
CORONA
M5-Ch-Cor Rd
Santa Ana River, Reach 3
Riverside Canal
C8-Prado Golf Course
C3-Prado Park
NORCO
Cal Cr
Mill Cr (Prado Area)
Gage Canal
Prado Park Lake
Temescal Wash
RIVER
Prado Basin
T1
Arlington Drain
Prado Dam
N
0 3 Miles

FIGURE 5-6: TMDL WATER QUALITY SAMPLING LOCATIONS



CALIFORNIA
Water Boards
STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

Map created January 2005
Map created by: HB

Data Sources:
Middle Santa Ana River Watershed:
based on Calwater v. 2.2.1 boundaries -
CA Spatial Information Library (2004),
Santa Ana River reach designations,
and GDT streets (SWRCB, 2002)
County: CA Spatial Information Library (2004)
Rivers/creeks, and lakes:
CA Spatial Information Library (1998)
2002 303(d) listed water bodies:
SWRCB (2003)

File name: wbr_tmdl_2.mxd

Task 4: Urban Discharges

Urban discharges, including stormwater runoff, include those from the cities and unincorporated communities in the Middle Santa Ana River Watershed. These discharges are regulated under the MS4 NPDES permits identified in Tasks 1.1 and 1.2 (Review and Revise Existing Waste Discharge Requirements), above. The requirements of these NPDES permits differ somewhat and therefore the TMDL implementation requirements that pertain to the permittees under each permit also vary slightly, as shown below[8].

4.1 Develop and Implement Bacterial Indicator Urban Source Evaluation Plans

On or before (*3 *months from the effective date of this Basin Plan amendment**), the County of San Bernardino, the County of Riverside, the cities of Ontario, Chino, Chino Hills, Montclair, Rancho Cucamonga, Upland, Rialto, Fontana, Norco, Riverside, and Corona, Pomona and Claremont shall develop a Bacterial Indicator Urban Source Evaluation Plan(s) (USEP). This plan shall include steps needed to identify specific activities, operations, and processes in urban areas that contribute bacterial indicators to Middle Santa Ana River Watershed waterbodies. The USEP shall be implemented upon Regional Board approval at a duly noticed public meeting.

4.2 Revise the San Bernardino County Municipal Storm Water Management Program (MSWMP)

Provision XVI.3. of Order No. R8-2002-0012 (see 1.1, above) requires the permittees to revise their Municipal Storm Water Management Program (MSWMP) to include TMDL requirements.

As soon as possible but no later than 2 years from the date of Regional Board approval of the USEP, the co-permittees shall review and revise the MSWMP as necessary to incorporate measures to address the results of the USEP. Further review and revision of the MSWMP needed to address this TMDL shall be completed in accordance with the requirements of Order No. R8-2002-0012 or amendments thereto that are adopted by the Regional Board at a public hearing. The MSWMP revisions shall include schedules for meeting the bacterial indicator wasteload allocations based on the schedule established in this TMDL. In order to facilitate any needed update of the numeric targets and/or the TMDLs and urban discharge WLA, the proposed schedule shall take into consideration the Regional Board's triennial review schedule. The permittees shall also provide a proposal for 1) evaluating the effectiveness of BMPs and other control actions implemented and 2) evaluating compliance with the bacterial indicator waste load allocation for urban runoff. The proposal must be implemented upon approval by the Regional Board after public notice and public hearing, or upon approval by the Executive Officer if no significant comments are received during the public notice period.

[8] The San Bernardino MS4 permit requires the development and implementation of a Municipal Stormwater Management Program (MSWMP) to address stormwater discharges from existing urban activities. For the Riverside County MS4 permit, the Drainage Area Management Plan (DAMP) addresses stormwater discharges from existing urban activities.

4.3 Revise the Riverside County Drainage Area Management Plan (DAMP)
Provision XIII.B. of Order No. R8-2002-0011 (see 1.2, above) requires the permittees to revise their Drainage Area Management Plan (DAMP) to include TMDL requirements.

As soon as possible but no later than 2 years from the date of Regional Board approval of the USEP, the co-permittees shall review and revise the DAMP as necessary to incorporate measures to address the results of the USEP. Further review and revision of the DAMP needed to address this TMDL shall be completed in accordance with the requirements of Order No. R8-2002-0011 or amendments/updates thereto that are adopted by the Regional Board at a public hearing. The DAMP revisions shall include schedules for meeting the final bacterial indicator wasteload allocations based on the schedule established in this TMDL. In order to facilitate any needed update of the numeric targets and/or the TMDLs and urban discharge WLA, the proposed schedule shall take into consideration the Regional Board's triennial review schedule. The revised DAMP shall also include a proposal for 1) evaluating the effectiveness of BMPs and other control actions implemented and 2) evaluating compliance with the bacterial indicator waste load allocation for urban runoff. The proposal must be implemented upon approval by the Regional Board after public notice and public hearing, or upon approval by the Executive Officer if no significant comments are received during the public notice period.

4.4 Revise the San Bernardino County Water Quality Management Plan (WQMP)
Provision XII.B. 1. of Order No. R8-2002-0012 requires the permittees to develop and submit a WQMP for new developments and significant redevelopments by January 2004 for the Executive Officer's approval.

As soon as possible but no later than 2 years from the date that the USEP is approved, the permittees shall submit a revised WQMP that addresses the bacterial indicator input from new developments and significant redevelopments to assure compliance with the bacterial indicator wasteload allocations for urban runoff. Further review and revision of the WQMP necessary to assure that TMDL requirements are addressed shall be completed in accordance with the requirements of Order No. R8-2002-0012 or amendments/updates thereto that are adopted by the Regional Board at a public hearing.

4.5 Revise the Riverside County Water Quality Management Plan (WQMP)
Provision VIII.B. of Order No. R8-2002-0011 (see 1.2, above) requires the permittees to develop and submit a WQMP for new developments and significant redevelopments by June 2004 for approval. On September 17, 2004, the Board approved a WQMP developed by the permittees. The approved WQMP includes source control BMPs, design BMPs and treatment control BMPs. Further revisions to the WQMP may be necessary to meet the WLA for urban runoff.

As soon as possible but no later than 2 years from the date that the USEP is approved, the permittees shall submit a revised WQMP that addresses the bacterial indicator input from new developments and significant redevelopments to assure compliance with the bacterial indicator wasteload allocations for urban runoff. Further review and revision of

the WQMP necessary to assure that TMDL requirements are addressed shall be completed in accordance with the requirements of Order No. R8-2002-0011 or amendments/updates thereto that are adopted by the Regional Board at a public hearing.

Task 5: Agricultural Discharges

Agricultural discharges, including stormwater runoff from agricultural land uses include those from concentrated animal feeding operations and irrigated and dry-land farming in the Middle Santa Ana River Watershed. Concentrated animal feeding operations are regulated under WDRs (see Task 1.3,above); irrigated agriculture and dry-land farming are not currently regulated.

5.1 Develop and Implement Bacterial Indicator Agricultural Source Evaluation Plans

On or before (*6 *months from the effective date of this Basin Plan amendment**), concentrated animal feeding facility operators and agricultural operators in the Middle Santa Ana River Watershed shall develop and implement Bacterial Source Agricultural Source Evaluation Plans (AGSEP). These plans shall include steps needed to identify specific activities, operations, and processes in agricultural areas that contribute bacterial indicators to Middle Santa Ana River Watershed waterbodies. The AGSEP shall be implemented upon Regional Board approval at a duly noticed public meeting.

The Regional Board expects that the AGSEP will be submitted and implemented pursuant to these TMDL requirements. Where and when necessary to implement these requirements, the Regional Board will utilize appropriate waste discharge requirements, including those for concentrated animal feeding operations (see 1.3, above).

In lieu of a coordinated source evaluation plan, one or more of the parties identified above may submit a proposed individual or group AGSEP to conduct the above studies for areas within their jurisdiction. Any such individual or group plan shall also be submitted for Regional Board approval no later than. (*6 *months from the effective date of this Basin Plan amendment**). This AGSEP shall be implemented upon Regional Board approval at a duly noticed public meeting.

5.2 Develop and Implement a Bacterial Indicator Agricultural Source Management Plan

No later than 2 years from the approval of the AGSEP, concentrated animal feeding operators and agricultural operators within the Middle Santa Ana River Watershed shall, as a group, submit a proposed Bacterial Indicator Agricultural Source Management Plan (BASMP). The BASMP shall be implemented upon Regional Board approval at a duly noticed public meeting. At a minimum, the BASMP shall include, plans and schedules for the following:

A. implementation of bacterial indicator controls, BMPs and reduction strategies designed to meet load allocations;

B. evaluation of effectiveness of BMPs; and

C. development and implementation of compliance monitoring program.

The Regional Board expects that the BASMP will be submitted and implemented pursuant to these TMDL requirements. Where and when necessary to implement these requirements, the Regional Board will utilize appropriate waste discharge requirements.

In lieu of a coordinated plan, one or more of the parties identified above may submit a proposed individual or group BASMP to develop and implement the above plan for areas within their jurisdiction. Any such individual or group plan shall also be submitted for Regional Board approval no later than 2 years from the approval of the AGSEP. This BASMP shall be implemented upon Regional Board approval at a duly noticed public meeting.

Task 6: Review/Revision of the Bacterial Indicator TMDL

The basis for the TMDLs and implementation schedule will be re-evaluated at least once every three years[9] to determine the need for modifying the load allocations, numeric targets and TMDLs. Regional Board staff will continue to review all data and information generated pursuant to the TMDL requirements on an ongoing basis. Based on results generated through the monitoring programs, special studies, modeling analysis, and/or special studies by one or more responsible parties, changes to the TMDL, including revisions to the numeric targets, WLAs and LAs, may be warranted. Such changes would be considered through the Basin Plan Amendment process.

The Regional Board is committed to the review of this TMDL every three years, or more frequently if warranted by the results of monitoring and/or other relevant studies

[9] The three-year schedule will coincide with the Regional Board's triennial review schedule.

References

1. California Regional Water Quality Control Board, Total Maximum Daily Load for Bacterial Indicators in the Middle Santa Ana River Watershed, February 3, 2005

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ATTACHMENT B

ENVIRONMENTAL CHECKLIST

ENVIRONMENTAL CHECKLIST

I. BACKGROUND

1. **Project title:** *Basin Plan amendment to incorporate Pathogen TMDLs for Santa Ana River–Reach 3, Mill Creek–Prado Area, Cucamonga Creek–Reach 1, Chino Creek–Reach 1, Chino Creek–Reach 2, and Prado Park Lake in the Middle Santa Ana River Watershed*

2. **Lead agency name and address:** *California Regional Water Quality Control Board, Santa Ana Region, 3737 Main Street, Suite 500, Riverside, CA 92501-3348*

3. **Contact person and phone number:** *Hope Smythe (909) 782- 4493*

4. **Project location:** *Middle Santa Ana River Watershed, San Bernardino and Riverside Counties*

5. **Project sponsor's name and address:** *California Regional Water Quality Control Board, Santa Ana Region, 3737 Main Street, Suite 500, Riverside, CA 92501-3348*

6. **General plan designation:** *Not applicable*

7. **Zoning:** *Not applicable*

8. **Description of project:** *Adoption of a Basin Plan amendment to incorporate Pathogen TMDLs for Santa Ana River–Reach 3, Mill Creek–Prado Area, Cucamonga Creek–Reach 1, Chino Creek–Reach 1, Chino Creek–Reach 2, and Prado Park Lake. The TMDLs establish wasteload allocations and load allocations for allowable pathogen inputs by all identified sources that discharge to Middle Santa Ana River waterbodies. The intent is to achieve numeric, water quality targets that will protect the beneficial uses of the waterbodies. The Basin Plan amendment includes an implementation plan that details the actions required by the Regional Board and other responsible parties for implementing the TMDLs.*

9. **Surrounding land uses and setting:** *Not applicable*

10. **Other public agencies whose approval is required:** *The Basin Plan amendment must be approved by the State Water Resources Control Board, the Office of Administrative Law, and the U.S. Environmental Protection Agency before it becomes effective.*

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:
The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Agricultural Resources	☐ Air Quality
☐ Biological Resources	☐ Cultural Resources	☐ Geology/Soils
☐ Hazards & Hazardous Materials	☐ Hydrology / Water Quality	☐ Land Use / Planning
☐ Mineral Resources	☐ Noise	☐ Population / Housing
☐ Public Services	☐ Recreation	☐ Transportation / Traffic
☐ Utilities / Service Systems	☐ Mandatory Findings of Significance	

II. DETERMINATION

On the basis of this initial evaluation:

X I find that the proposed project COULD NOT have a significant effect on the environment.

____ I find that the proposed project MAY have a significant effect on the environment. However, there are feasible alternatives and/or mitigation measures available that will substantially lessen any adverse impact. These alternatives are discussed in the attached written report.

____ I find that the proposed project MAY have a significant effect on the environment. There are no feasible alternatives and/or feasible mitigation measures available that would substantially lessen any significant adverse impact. See the attached written report for a discussion of this determination.

_____ _____
Signature Date

Hope Smythe
Senior Environmental Specialist

III. ENVIRONMENTAL IMPACTS

CEQA Checklist

Question	Potentially Significant Impact	Less Than Significant With Mitigation Incorporation	Less Than Significant Impact	No Impact
I. AESTHETICS - Would the project:				
a) Have a substantial adverse effect on a scenic vista?				X
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?				X
c) Substantially degrade the existing visual character or quality of the site and its surroundings?				X
d) Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?				X
II. AGRICULTURE RESOURCES: In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?				X
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?				X
c) Involve other changes in the existing environment that, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?				X
III. AIR QUALITY - Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?				X
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?				X
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient				X

CEQA Checklist

Question	Potentially Significant Impact	Less Than Significant With Mitigation Incorporation	Less Than Significant Impact	No Impact
air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?				
d) Expose sensitive receptors to substantial pollutant concentrations?				X
e) Create objectionable odors affecting a substantial number of people?				X
IV. BIOLOGICAL RESOURCES - Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?				X
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations, or by the California Department of Fish and Game or US Fish and Wildlife Service?				X
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?				X
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?				X
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?				X
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?				X
V. CULTURAL RESOURCES - Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in ¤15064.5?				X
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to ¤15064.5?				X
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?				X

CEQA Checklist

Question	Potentially Significant Impact	Less Than Significant With Mitigation Incorporation	Less Than Significant Impact	No Impact
d) Disturb any human remains, including those interred outside of formal cemeteries?				
VI. GEOLOGY AND SOILS - Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				X
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.				X
ii) Strong seismic ground shaking?				X
iii) Seismic-related ground failure, including liquefaction?				X
iv) Landslides?				X
b) Result in substantial soil erosion or the loss of topsoil?				X
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on-site or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?				X
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?				X
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?				X
VII. HAZARDS AND HAZARDOUS MATERIALS - Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?				X
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?				X
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?				X

CEQA Checklist

Question	Potentially Significant Impact	Less Than Significant With Mitigation Incorporation	Less Than Significant Impact	No Impact
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?				X
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?				X
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?				X
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?				X
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?				X
VIII. HYDROLOGY AND WATER QUALITY - Would the project:				
a) Violate any water quality standards or waste discharge requirements?				X
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?				X
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on-site or off-site?				X
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on-site or off-site?				X
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?				X
f) Otherwise substantially degrade water quality?				X
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?				X

CEQA Checklist

Question	Potentially Significant Impact	Less Than Significant With Mitigation Incorporation	Less Than Significant Impact	No Impact
h) Place within a 100-year flood hazard area structures that would impede or redirect flood flows?				X
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?				X
j) Inundation by seiche, tsunami, or mudflow?				X
IX. LAND USE AND PLANNING - Would the project:				
a) Physically divide an established community?				X
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?				X
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?				X
X. MINERAL RESOURCES - Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?				X
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?				X
XI. NOISE - Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?				X
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?				X
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?				X
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?				X
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people				X

CEQA Checklist

Question	Potentially Significant Impact	Less Than Significant With Mitigation Incorporation	Less Than Significant Impact	No Impact
residing or working in the project area to excessive noise levels?				
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?				X
XII. POPULATION AND HOUSING - Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?				X
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?				X
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?				X
XIII. PUBLIC SERVICES				
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services: Fire protection? Police protection? Schools? Parks? Other public facilities?				X
XIV. RECREATION - Would the project:				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?				X
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?				X
XV. TRANSPORTATION/TRAFFIC - Would the project:				
a) Cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?				X

CEQA Checklist

Question	Potentially Significant Impact	Less Than Significant With Mitigation Incorporation	Less Than Significant Impact	No Impact
b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?				X
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?				X
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?				X
e) Result in inadequate emergency access?				X
f) Result in inadequate parking capacity?				X
g) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?				X
XVI. UTILITIES AND SERVICE SYSTEMS – Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?				X
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?			X	
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?			X	
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?				X
e) Result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?				X
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?				X
g) Comply with federal, state, and local statutes and regulations related to solid waste?				X
XVII. MANDATORY FINDINGS OF SIGNIFICANCE -				

CEQA Checklist

Question	Potentially Significant Impact	Less Than Significant With Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?				X
b) Does the project have impacts that are individually limited, but cumulatively considerable? ('Cumulatively considerable' means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?				X
c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?				X

Attachment - Environmental Checklist

Discussion of Environmental Impacts

Explanation of Environmental Checklist "Less than significant" Answers

Note: Adoption of the Basin Plan amendment to incorporate Bacterial Indicator TMDLs for Middle Santa Ana River Watershed waterbodies will not have any direct impact on the environment. Implementation of actions necessary to achieve the TMDLs may affect the environment, as described below. However, the intent of TMDL implementation is to restore and protect the water quality of the waterbodies and their beneficial uses. Any potential adverse environmental effects associated with TMDL implementation will be subject to project-specific CEQA analysis and certification to assure appropriate avoidance/minimization and mitigation.

XVI. Utilities and Service Systems (b), (c)

The proposed TMDLs call for reductions in bacterial indicator contributions to the waterbodies from storm drainage systems. To achieve these reductions, modifications to storm drainage systems may be necessary. Connection of existing storm drainage systems to sewer systems may require collection and/or wastewater treatment plant modifications/expansions, with attendant construction-related environmental effects. In addition, wastewater treatment plant modifications may be needed to meet the bacterial indicator wasteload allocations. Any such projects associated with sewer or storm drainage systems modifications would be subject to further, case-specific environmental review and certification.